A

TREATISE

ON

GEOGRAPHY,

THE

USE OF THE GLOBES,

AND

ASTRONOMY;

IN THE ORDER WHICH THE MUTUAL CONNECTION AND DEPENDENCE OF THE SEVERAL PARTS REQUIRE, TOWARDS A PERFECT UNDERSTANDING OF THE WHOLE.

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The Earth is measured by means of the Heavens, the Heavens by means of the Earth; and by the celestial and terrestrial Globes certain Phænomena and Affections, appertaining to both the Heavens and Earth, are demonstrated.

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PREFACE.

A PROGRESSIVE order from first principles is the only method whereby any science can find an easy entrance into the uninformed mind, or afford its pupil a just and ready way to proficiency.

The success I have experienced in the gradation and illustration which I have adopted in the following treatise, originally suggested the idea of making it public.

Much care has been taken to render the full sense of definitions, the most interesting particulars in descriptions, and the best illustrations, in a comprehensible and concise manner. I trusted not to my own knowledge where there seemed a possibility of error, and spared no labour in seeking for, and examining the best authorities. The order is such as may make the whole well understood with the least difficulty. Where I have adopted any author's mode or words, it has been because I could not have

offered what was superior or so good of my own.

Some few imperfections of style, and deviations from uniformity, escaped my notice till it was too late to make an alteration: for these errors, and those mentioned in the errata, the indulgent reader will make favourable allowances.

On the subject of Geography, it is to be remarked, that the greatest part of the earth's surface is totally unknown, a great part imperfectly known, and only a small part well known. Wars also, and treaties, make innovations in the subdivisions of territories; and some places of ancient fame lose their renown, while others, formerly unknown, command attention from their increasing consequence.

A particular geographical description even of a single province might well engross a large volume; a small book, therefore, cannot comprize a very circumstantial account of many kingdoms and states.

Even the best small maps which represent an extensive country, must unavoidably be imperfect: maps, therefore, of this description, which

which are injudiciously executed, may tend to give very false ideas of the situation and extent of places.

Books and maps of general Geography, extending to particular descriptions, are extremely voluminous and expensive, and, after all, uninteresting to most readers in the greatest part of their contents.

The geographical part of the following treatise is calculated to convey a general knowledge of Geography, and such particular informations as are likely to prove the most useful and interesting, which are such likewise as it becomes every one to be acquainted with.

The Continents, with their grand divisions, &c. are laid down in tables, after the manner of Templeman, Guthrie, and others. The length and breadth of each kingdom, &c. inserted in them, may serve to give an idea of their several dimensions, though neither the direction in which their lengths and breadths are taken, nor the figures which their respective boundaries determine them to have, are mentioned.

The

The Oceans, the Seas, Lakes, Bays, &c. a particular deſcription of ſeveral principal iſlands; a particular deſcription of the chief cities in the European kingdoms and ſtates; new diſcovered iſlands; the principal mountains, iſthmuſes and rivers; the ſituations of principal towns, capes, &c. with their latitudes and longitudes, are ſeverally treated of under their reſpective heads: therefore, in treating of the grand diviſions of the continents, little more is mentioned than the boundaries, the principal ſubdiviſions, the ancient names, and a few intereſting particulars. England, Scotland, and Ireland, however, are more particularly deſcribed, and their rivers, &c. are inſerted in their reſpective chapters.

As moſt geographical ſtudents provide themſelves with ſome particular maps on a large ſcale; and as thoſe who uſe globes have a map of the world on the only true principle, which alſo is commonly much larger than could be conveniently folded up in an octavo volume, I have rather choſen to give this treatiſe a chance of being brought into uſe from an eaſy purchaſe, than to add a number of maps which would have made it expenſive, without exhibiting much more information than may be gained from a good ſized terreſtrial globe.

When

When a person has obtained a general knowledge of Geography, and wishes for more particular information, I would advise him to procure the best particular descriptions, and the best maps on a large scale, of those countries of which he desires to have a perfect knowledge.

In the part of the following work, which treats on the Use of the Globes, I have endeavoured to render every useful species of information attainable, from either common or particular constructed globes. And,

In the part which treats on Astronomy, I have diligently digested such interesting particulars, from the first authorities, and my own experience, as may deserve attention from every one who aspires to a knowledge of this sublime science, and who wishes for such information, as candidates for scientific knowledge are thought ignorant without.

Of the many plates, which are frequently inserted in books of Astronomy, I have thought proper to omit some, because the ideas which would have been derived from them can be as easily and more justly obtained by good definitions, and a consideration of nature itself.

ERRATA.

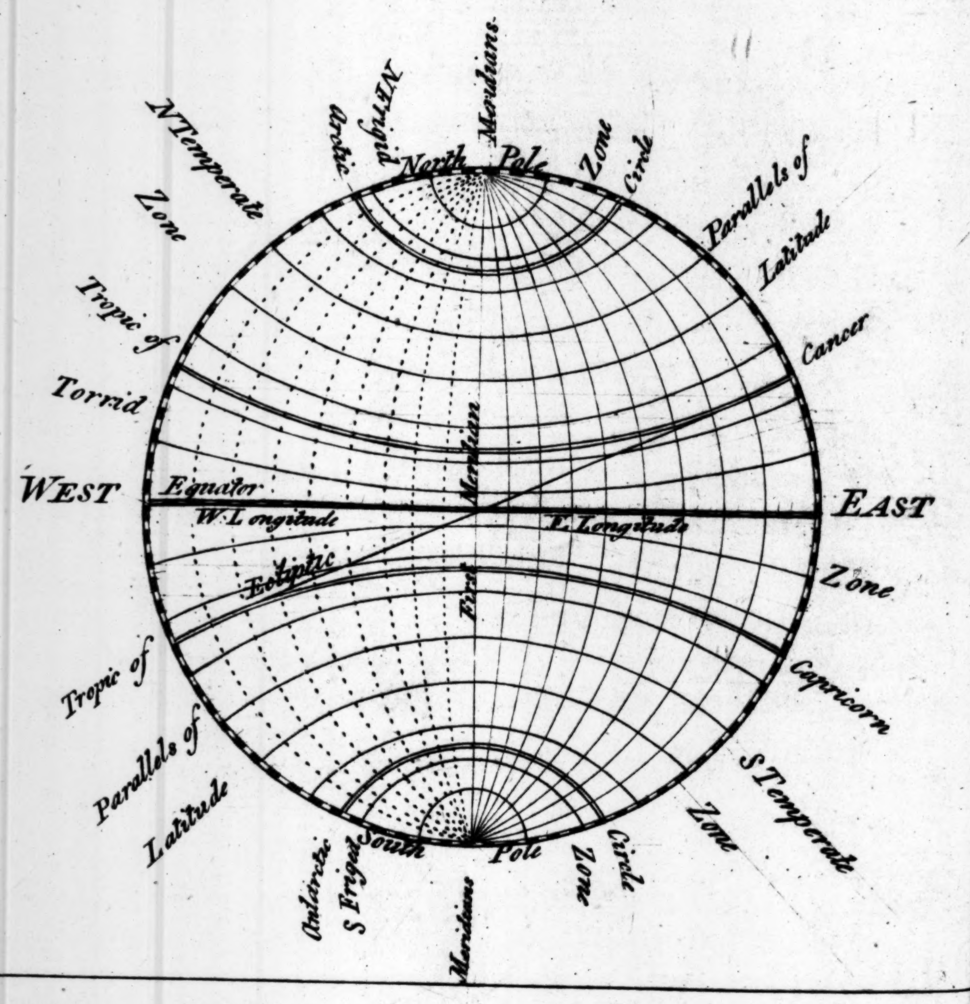
ERRATA.

Page 52, line 13, for 56', read 56°.
—— 53, last line but two, for *ocean*, read *oceans*.
—— 66, line 3, for *south* read *north*.
—— 67, line 3, for 50° 6', read 6° 5' of west longitude.
—— 90, line 9, after *Dee* and *Don*, read, *which fall into the sea at Aberdeen*.

In paragraph 190, for *Sygizies*, read *Sizigies*.

THE

Geographical TERMS explain'd at one VIEW.



THE

INTRODUCTION.

SECT. I.

1. BEFORE observation and experience had confirmed men in a knowledge of the true figure of the earth, it was generally thought to be an extended plain, bounded by the firmament, in which the sun, moon, and stars were supposed to move daily from east to west.

2. Many other opinions have been entertained of the figure of the earth, all of which have proved equally unaccountable and improbable; experience has at length shown it to be globular.

It is evident that it can be of no other form; for in every place where ships are observed to leave the land, they disappear gradually and uni-

formly, from their lower parts upward, till they entirely vaniſh, the laſt viſible parts being their upper ſails.

Two ſhips at ſea, at the greateſt viſible diſtance from each other, ſhew only their upper ſails; and, if the diſtance is decreaſing, they appear to each other to be gradually emerging from the water, till they become in full view.

If there were no interception to a ſhip's ſteering the ſame courſe, it would, by continuing to ſail on the ſame point, arrive at the place it failed from; in the ſame manner as an inſect, by creeping directly forward on a ball, would arrive at the ſame point it went from.

The globular figure of the earth is further confirmed by eclipſes of the Moon; for the darkened part, or ſhadow, is always bounded by a circular curve, though cauſed by different ſituations of the earth.

3. The earth, however, is not a direct ſphere, but oblate, that is, flattened in two oppoſite parts, called poles; Sir Iſaac Newton demonſtrated this to be the caſe, from mechanical principles; and it was afterwards proved to be ſo by actual

actual mensuration in the year 1736 *: but the figure of the earth differs so little from a direct sphere, that it may be represented by the largest artificial globe without any sensible error.

4. A globe which has the several parts of land and water represented on its surface, in such respective proportions and positions, as observation and admeasurement have discovered them to have on the earth itself, is called a *Terrestrial Globe*; and is a miniature representation of the known surface of the earth.

SECT. II.

As the united knowledge and experience of men have been combined in describing the situation of different parts of the earth, and the face of the heavens, and as such knowledge has been committed to maps, charts, plates, and globes, it will be well to transfer the delineations of science to the consideration of nature itself, and vice versa; (as may best suit the purpose intended;) and so to reason between them, as at once, to make the study useful, entertaining, and easy.

* By a company of astronomers, employed by the French king to measure a degree of the meridian near the equator, and a degree of the meridian near the polar circles.

The principal parts into which the whole globe of the earth is divided are eight, four belonging to land and four to water, which bear the similarity to each other, that appears in the following description.

LAND.	WATER.
1. A Continent is a large extent of land, without any entire separation of its parts by water, as America, Europe, &c.	1. An Ocean is a large extent of water, without any entire separation of its parts by land, as the Pacific Ocean, the Atlantic, &c.
2. An Island is a tract of land entirely surrounded by water, as Great Britain, Ireland, &c.	2. A Lake * is a tract of water surrounded by land, as the Lakes of Canada, the Lake of Geneva, &c.
3. A Peninsula is a portion of land encompassed all but in one part by water, as South America, the Morea, in Greece, &c.; when the part, where it begins to project from the land, is very wide, lies high, and does not extend to any great distance, it is called a Promontory; the points of a Peninsula and Promontory are called Capes.	3. A Gulph, or inland sea, (so called, if very large,) is a portion of water encompassed, all but in one part, by land, as the Mediterranean Sea, the Gulph of Venice, &c.; when the part is very wide where it begins to project into the land, and does not extend to any great distance, it is called a Bay, and, if very small, a Creek, or haven for ships.

* Lakes sometimes communicate with each other, and with other waters.

4. An

LAND.

4. An Isthmus is a narrow passage of land, which unites a Peninsula to a Continent, or joins one Continent to another, as the Isthmus of Suez, which joins Asia to Africa; the Isthmus of Corinth which unites the Morea to Greece, or to the Continent of Europe.

WATER.

4. A Strait, or Channel, sometimes called a Sound, is a narrow passage of water which joins a sea to the ocean, or one ocean to another, as the British Channel, which joins the British Ocean to the Atlantick, the Straits of Gibraltar, which join the Mediterranean Sea, to the Atlantick Ocean.

5. On the terrestrial globe the continents are generally divided from each other by a kind of chain line; empires, kingdoms, and provinces are separated from each other by dotted lines; rivers are denoted by black lines, and are wider at the mouth than towards the spring or head; mountains are sketched as in a picture; woods are denoted by a kind of shrub; desarts, plains, and valleys can only be distinguished by name; bogs and morasses are shaded; coasts and shores are shaded towards the land; and sands and shallows are shown by small dots.

6. The same distinctions are commonly observed in maps, and when only small parts of a continent are represented, double lines are often put to denote roads.

7. In sea charts the depth of water near harbours, sands, and shallows, is expressed by figures signifying fathoms; and lines are drawn from several parts, to shew the point of the compass which other places bear on with respect to the parts from which the lines are drawn.

8. Arrows are sometimes placed in maps and charts, to shew the direction of winds and currents.

9. The top of a map or chart, or where the fleur-de-lis points, is the north; the bottom, or opposite to the north, is the south; the right side, with respect to the top, is east, and the left west; these four are called the cardinal points of the compass; half way between the north and the east is called north-east; half way between south and the west, south-west, &c. Mariners divide the compass into thirty-two points, and these points again into halves and quarters.

Certain circular lines are described on the surface of a terrestrial globe, and on maps, as standards whereby to determine the distances and situations of places, which lines may be conceived to be likewise drawn on the earth itself; and if they be supposed to be generated from

the earth's center, and continued in the same direction to the heavens, they will there shew the corresponding celestial circles.

SECT. III.

A terrestrial globe is furthermore meant to represent the earth, by being moveable on its axis.

10. The *Axis* of a globe or sphere, is that line in which motion centers, and from which motion is generated; it passes through the centre of the revolving body, and terminates in two points on the surface, diametrically opposite.

11. Any two points on the surface of a globe or sphere, which are diametrically opposite, are called the *Poles* of that circle, which is, or may be conceived to be in every part, at an equal distance between them.

12. The extremities of the earth's axis are called the *North* and *South Poles*, and the heavens over these extremities appear to be motionless, while all other parts seem in a continual state of revolution; the circle of motion appears to increase with the distance from the apparently motionless points, to that circle in the heavens, which is at an equal distance between them, and of which

they are the poles, and is called the *Equinoctial*, from the nights being equal in length to the days when the sun appears therein.

From the apparent motion of the heavens, just mentioned, it is evident that either the fixed stars, together with the sun and planets * really do move round the earth, or that such appearances are occasioned by a rotation of the earth on its axis, which would likewise cause the different celestial bodies to rise, culminate, and set, and thereby produce the vicissitudes of day and night.

The sun is proved by astronomers to be more than a million times larger than the earth, and at its mean distance to be more than 95 millions of miles from it. Some of the planets are likewise known to be much larger than the earth, and more distant than the sun; and the nearest fixed stars are conjectured, from observa-

* The planets are constantly changing their situations with respect to the fixed stars and each other, and are known to revolve about the sun in certain periods of time. They do not appear to twinkle as the fixed stars do; and, when viewed through a telescope, they are magnified according to the power of the instrument: whereas the fixed stars always appear as dimensionless points, and have been generally observed to keep the same distance with regard to each other.

tion and calculation, to be four hundred thousand times further from the earth than the ſun is. Is it then more reaſonable to ſuppoſe the earth to have motion, or to ſupport the inconceivable velocity of ſuch diſtant bodies, paying their devoirs with their bulky forms to our comparatively dimenſionleſs point the earth?

Nature is always grand in her deſigns, but never does that in a complicated and laborious manner, which admits of a more ſimple and eaſy one. Harmony is found to prevail in every part of the creation; and the utmoſt ſkill and contrivance manifeſts itſelf with the moſt aſtoniſhing effects from only a few ſimple principles.

13. The ſun moreover, and thoſe planets on which there are viſible ſpots, turn round on their axes, for the ſpots move regularly over their diſks, or faces, in equal ſpaces of time; whence we may reaſonably conclude, that the other planets on which we ſee no ſpots, and the earth, which is likewiſe a planet, have ſuch rotations.

14. The oblate figure of the earth demonſtrates its diurnal motion; for, if it were at reſt, the waters, to preſerve their level, would leave the equatorial regions, and overflow the polar ones; but

but all material forms which revolve on an axis have a tendency or greater power to protuberate, or fly off, in proportion as the parts are more distant from the axis: from this property of mechanics, and from a belief of the earth's diurnal motion, Sir Isaac Newton demonstrated it to be oblate.

15. That the earth is a planet, and revolves about the sun in the space of a year, is inferred from different and corroborating phænomena in the apparent celestial motions, and from the known laws of gravity, in which there can be no such thing as a heavy * body moving round a light one, as its centre of motion.

SECT. IV.

16. It is known by experience, that material objects attract each other in proportion to the quantity of matter they contain, compounded with their distances; for gravity is found to decrease as the square of the distance increases; that is, a body at twice any first given distance, attracts with only a fourth part of the force it

* The quantity of matter in the sun, from the laws of gravity, is proved to be much greater than what is contained in all the planets together.

would attract with at the given first distance; and at three times the distance with only a ninth part of the force, &c.

17. A double velocity will balance a quadruple power of gravity or attraction, so that if the velocity of any planet were twice as great as it is, it would require the sun's attraction to be four times greater than it is to retain it in its orbit,

18. We cannot, from any other causes than those of attraction and gravity, account for the planets being retained in their orbits or paths, which they pursue in going round the sun, nor for many other phænomena which constantly occur.

19. Matter of itself is inactive, therefore, when we see a body in motion, we conclude that some power gave it that motion, and that its motion will continue till the power is overcome by the resistance of some other substance: thus, a ball shot from the mouth of a cannon, is so resisted by the air and the attraction of the earth, that its velocity constantly decreases, and it is more and more drawn out of a straight line into a curve, till its power is entirely overcome.

All

20. All ſimple motion is naturally rectilineal, and therefore it is ſuppoſed, that all the planets had a force impreſſed on them originally by their Creator, which, together with the attraction of the ſun, placed nearly in the common center of the orbits of the planets, make them obey that wiſe and beneficent order they were intended to fulfil.

21. It is from the power of attraction that the inhabitants of the earth on every part regard towards the earth as downward, and from it as upward, and that every ſubſtance, in proportion to the quantity of matter it contains, has its weight or tendency towards the earth.

SECT. V.

22. With reſpect to the diurnal or annual motion of the earth, it is impoſſible that we can feel either, ſince we cannot feel the motion of a ſhip on ſmooth water; and the earth meets with no ſuch groſs reſiſtance as water, and its motion is incomparably more uniform than any machine made and moved by human art.

23. It is well known that fixed objects appear to change their place to an obſerver in motion, while the moving body ſeems to be at

reſt; for to ſpectators in a ſhip, ſailing by objects on land, or ſhips at reſt, the bodies at reſt have to appearance the ſame degree of motion which the ſhip really has, only they ſeem to move the contrary way.

24. It is confirmed by obſervation and experiment, that a body projected from another body in motion, will partake of the motion of the moving body. A ſtone dropped from the top-maſt of a ſhip under ſail, will fall on the ſame point it would have fallen on had the ſhip remained motionleſs; and flies can as eaſily dance among one another in a moving cabin as in the room of a houſe.

25. The air which encompaſſes the earth is a part of itſelf, and all bodies which move in it, either by mechanical or animal force, muſt conſtantly, from attraction, and the reſiſtance of the air, be governed by the earth's motion.

SECT. VI.

26. The circle of the earth which is under the Equinoctial, is called the *Equator*, and is repreſented on a terreſtrial globe by a circle equidiſtant in all its parts from its two poles; it divides the ſurface of the globe in two equal

parts, called the northern and southern hemispheres, each having its respective pole.

27. The equator, and all other circles which divide a globe in two equal parts, are called *Great Circles*; and those which divide a globe in two unequal parts are called *Small Circles*; and all *Circles*, whether great or small, are supposed to contain 360 equal parts, called degrees, each degree 60 equal parts, called minutes, and each minute 60 equal parts, called seconds. A degree on the earth itself is equal to 60 geographical miles, or 69½ English measure.

28. The equator, on a terrestrial globe is crossed at right angles, (one line or circle is said to be at right angles, or upright with respect to another when it does not incline on either side,) by circular lines drawn from pole to pole, that is, directly north and south, called *Meridians*, from its being mid-day, or noon, when the sun is directly over any part of such supposed line on the earth. These lines, if continued round the globe, divide its surface in two equal parts, which are the eastern and western hemispheres, with respect to any meridian, and its opposite, which causes such division. The equator on English globes is generally numbered east and west to 180 degrees from that meridian which passes

passes through London, which is the opposite meridian, and where the east and west unite with respect to London: it is likewise numbered quite round to 360°, beginning and ending where an intersection is made by a great circle which crosses the equator in two opposite points, called Aries and Libra, reckoned from that called Aries, for the purpose of finding the right ascension, &c. (hereafter defined) of celestial objects on the globe.

29. When the distance of any place is known from the equator, and likewise from any meridian fixed on, its exact situation may be found. The distance of a place, north or south from the equator, is called *Latitude*, and is said to be north or south, according to the hemisphere it is in. And the distance of a place from any meridian fixed on, is called the *Longitude* from such meridian, and is said to be east, if on the right side of the meridian, reckoning the north to be the top, and west, if on the left.

30. The brass hoop on which the globe hangs, and within which it turns, commonly called the *Brass Meridian*, represents the meridian of any place which may be brought to it; and it likewise shews the latitude of places which may

may be brought to it; for that purpoſe it is graduated on the half which ſhould be uppermoſt, into degrees, beginning with 0 over the equator, on which places have no latitude, and is numbered from the equator on both ſides, to each pole, or 90 degrees, which is the greateſt latitude or diſtance from the equator. The other half of the braſs hoop, which is an oppoſite meridian, or 180° diſtant, is numbered from each pole, beginning with 0 and ending at 90 degrees in the equator, for the purpoſe of working certain problems.

31. The ſmall circles on the globe, which are parallel to the equator, are called *Parallels of Latitude*; they may be conceived to paſs through every or any point of the earth's or globe's ſurface, as the meridians may likewiſe be ſuppoſed to do; therefore both the parallels and meridians may be drawn on the terreſtrial globe, or on maps, which repreſent it wholly, or in part, at any convenient diſtance aſunder.

32. The latitude of places on maps is found on the upright lines, or outermoſt meridians, which are numbered in degrees, &c. in the ſeveral points of them, according to their different diſtances from the equator. The parallel circles

cles will ſhew in what direction from the given place the required latitude is to be ſought: if the place be between two parallels, the latitude will be found at the ſame proportional diſtance between them as the place itſelf.

33. The longitude of places in maps is found on the lowermoſt or uppermoſt parallels, (the uppermoſt are on a ſmaller ſcale than the lowermoſt) which are graduated into degrees, &c. of longitude: the meridians ſhew in what direction from the given place the required longitude is to be ſought: if the place be between two meridians, the longitude will be found at the ſame proportional diſtance between them as the place itſelf.

From the inclination of the meridians, as they increaſe in diſtance from the equator, it evidently appears, that the degrees on the parallels of latitude muſt conſtantly decreaſe from the equator to the poles, where the meridians all meet in a point; and hence it is, that a degree of longitude is no where the ſame but upon the ſame parallel; and that upon the equator only, a degree of longitude is equal to a degree of latitude.

34. By taking the diſtance between any two meridians on the ſame parallel, and applying ſuch diſtance on the equator, the proportion between a degree of longitude on the equator and on the parallel may be ſeen, and conſequently how many miles make a degree of longitude in the parallel meaſured may be eaſily known. By this rule it will be found, that the proportion between a degree of longitude in latitude 60, and on the equator, is as two to one; therefore a degree of longitude in latitude 60, is only 30 miles, or half what it is on the equator.

A TABLE,

A TABLE,

SHEWING

The Number of Miles contained in a Degree of Longitude, in each Parallel of Latitude from the Equator.

Degrees of Latitude.	Miles.	100th Parts of a Mile.	Degrees of Latitude.	Miles.	100th Parts of a Mile.	Degrees of Latitude.	Miles.	100th Parts of a Mile.
1	59	99	31	51	43	61	29	04
2	59	97	32	50	88	62	28	17
3	59	92	33	50	32	63	27	24
4	59	86	34	49	74	64	26	30
5	59	77	35	49	15	65	25	36
6	59	67	36	48	54	66	24	41
7	59	56	37	47	92	67	23	45
8	59	46	38	47	28	68	22	48
9	59	20	39	46	62	69	21	51
10	59	08	40	45	95	70	20	52
11	58	89	41	45	28	71	19	54
12	58	68	42	44	95	72	18	55
13	58	46	43	43	88	73	17	54
14	58	22	44	43	16	74	16	53
15	57	95	45	42	43	75	15	52
16	57	67	46	41	68	76	14	51
17	57	37	47	40	92	77	13	50
18	57	06	48	40	15	78	12	48
19	56	73	49	39	39	79	11	45
20	56	38	50	38	57	80	10	42
21	56	00	51	37	76	81	09	38
22	55	63	52	36	94	82	08	35
23	55	23	53	36	11	83	07	32
24	54	81	54	35	26	84	06	28
25	54	38	55	34	41	85	05	23
26	53	93	56	33	55	86	04	18
27	53	46	57	32	67	87	03	14
28	52	97	58	31	79	88	02	09
29	52	48	59	30	90	89	01	05
30	51	96	60	30	00	90	00	00

35. In ſome maps the longitude is given in time, by hours and minutes. The proportion between hours and degrees, minutes or miles of longitude, and minutes of time, &c. is as fifteen to one, that is, fifteen degrees of longitude are equal to one hour of time, and fifteen miles of longitude, to one minute in time, &c. which proportion is evident: for as the earth revolves once in 24 hours 360 degrees, the content of all circles on its ſurface revolve with it in that time; and, as the motion is uniform, the 24th part of 360 degrees, which is 15, muſt revolve in one hour; ſo that longitude may be brought into time by dividing by 15, and time into longitude by multiplying by 15. The hours, &c. are ſaid to be eaſt or weſt of the meridian reckoned from, the ſame as the longitude in degrees, &c.

36. The diſtance of places on maps may be found by extending the legs of a pair of compaſſes from one place to the other, or by taking the diſtance with a piece of thread, and applying it to the ſcale, which is generally placed in ſome conſpicuous part: if there be no particular ſcale to the map, the outer meridians will anſwer the purpoſe. Maps which give the exact latitudes and longitudes of places, from being delineated

delineated on a plane ſurface, cannot give the exact diſtance of places; yet they anſwer tolerably exact in moderate diſtances.

37. The terreſtrial globe, as has before been obſerved, is a miniature repreſentation of the known ſurface of the earth; therefore, the latitudes and longitudes of places on it may, with their juſt proportions, be truly repreſented, as likewiſe the bearings and diſtances of places, together with their proportional magnitudes; but in maps there muſt always be a ſacrifice of at leaſt one of theſe properties of the globe to the plane ſurface of the map. When the map is a perſpective repreſentation of the globe, or a part thereof, the proportional magnitudes of places cannot be truly ſhown; but yet the true latitudes and longitudes of places may be preſerved, by a contraction or expanſion of the degrees, ſo as to favour the repreſentation. In a perſpective repreſentation of maps, where the eye is ſuppoſed to be near the projection, and directed towards the center, the projection is called *Stereographic*; and when the eye is ſuppoſed to be at an infinite diſtance, the projection is called *Orthographic*. In the Stereographic projection, the extremities of the hemiſphere

are more expanded, as the diſtance is greater from the eye. In the orthographic projection, the extremities of the map are more contracted as the diſtance is greater from the eye. A repreſentation of an hemiſphere of the globe, as if cut from the poles, through oppoſite meridians, is ſaid to be on the *Plane of the Meridian*; if as cut through the equator, where the north or ſouth pole is the center, the projection is ſaid to be on the *Plane of the Equator*; and if the globes be ſuppoſed to be divide dinto two equal parts from the center, ſo as to leave any place in the center of the projection, or at an equal diſtance from the extremities of the ſection, the projection is then ſaid to be on the *Plane of the Horizon* of that place. Theſe different projections are uſed, as they prove favourable to the repreſentation of certain parts moſt neceſſary to be ſhown.

SECT. VII.

38. The path which the earth purſues in its orbit, or annual courſe round the ſun, is called the *Ecliptic*; and if that ſpace which lies evenly and directly from the ſun's center to the circumference deſcribed, were infinitely extended in the ſame plane, it would be called the *Plane of the Earth's*

Earth's Orbit. The latitude of celestial objects is their distance from this plane; and the inclination of the orbits of all the planets, and of their axes, are reckoned as they respect this plane.

39. The constant revolution of the earth causes the sun apparently to revolve in the same plane; and our sight transfers it to that part of the heavens which is directly opposite to the earth's situation. In moving round any object, or when any object is moved round us, in a line with the eye, we transfer it to the furthest visible and opposite distance; and it appears to coincide with, or eclipse all the objects which are in the same straight line with it. So, from the earth's motion, the sun appears, in the space of a year, to have made one complete course round the heavens; and from this appearance the ecliptic is called *Via Solis*, or the *Sun's Path*; for it is customary to speak of apparent motions as real, when the conclusion is not affected by it.

40. The ecliptic on globes is represented by that great circle which crosses the equator in two opposite points, called *Aries* and *Libra*; it is divided in twelve equal parts, called signs; and

each ſign into thirty equal parts, called degrees, making in all 360 (the content of a circle), which nearly anſwer to the days in a year.

41. The ancients, in reducing aſtronomy to a ſcience, combined the fixed ſtars into conſtellations, to which they gave names, with reſpective figures, drawn in a certain manner and magnitude, over the ſtars combined for that purpoſe; this enabled them to ſignify to others any particular ſtar they meant to notice, by ſaying in what part of the figure of the conſtellation it was contained. The conſtellations, or ſigns, which the ſun apparently paſſes over in a year, and which are noted by certain characters, are, *Aries*, the Ram, *Taurus*, the Bull, *Gemini*, the Twins, *Cancer*, the Crab, *Leo*, the Lion, and *Virgo*, the Virgin; theſe ſix are called our ſummer ſigns, and are ſituated on the north ſide of the equinoctial; the other ſix, called our winter ſigns, are on the ſouth ſide of the equinoctial, and are called, *Libra*, the Balance, *Scorpio*, the Scorpion, *Sagittarius*, the Archer, *Capricornus*, the Goat, *Aquarius*, the Waterman, and *Piſces*, the Fiſhes; they are marked in the order juſt given, thus, ♈, ♉, ♊, ♋, ♌, ♍; ♎, ♏, ♐, ♑, ♒, ♓. About the

20th of March the sun appears in the first degree of the sign Aries, which *is one of the two points where the ecliptic intersects the equinoctial*; from which time it continually appears to approach towards the north pole, till about the 21st of June, at which time it enters the first degree of Cancer, called the Summer Solstice, which is almost $23\frac{1}{2}$ degrees north of the equinoctial; from the 21st of June, the sun appears continually to approach the equinoctial, till about the 22d of September, at which time it enters the first degree of Libra, *the other point where the ecliptic intersects the equinoctial*, directly opposite to the first degree of Aries: these two points, Aries and Libra, are called the *Vernal and Autumnal Equinoxes*, and the two meridians which pass through them, are called the *Equinoctial Colures*. From about the 22d of September the sun appears continually to approach towards the south pole, till about the 21st of December, called the winter solstice, at which time the sun appears to enter the first degree of *Capricorn*, which is almost $23\frac{1}{2}$ degrees to the southward of the equinoctial. The two meridians which pass through the two opposite points of the ecliptic, viz. the first degree of Cancer and of Capricorn, are called the *Solstitial Colures*; and

and those parallels which pass through the same points, are called the *Tropics of Cancer* and *Capricorn*. From about the 21st of December the sun continually approaches the equinoctial, till about the 21st of March, at which time it appears again in the circle of the equinoctial; having from the time of its leaving the same point, appeared, from the earth's diurnal rotation, to have formed nearly 365¼ spiral revolutions.

42. The distance of the sun from the equinoctial, is called *Declination*.

SECT. VIII.

43. The parts of the earth under that space in the heavens, which the sun passes over in a year, comprehends what the ancients called the *Torrid Zone*; it extends about 23½ degrees on each side of the equator. The two *Frigid Zones* are each contained between the polar circles and their respective poles; they extend from latitudes 66½ to latitude 90, being 23½° in breadth. Between the torrid and the two frigid zones, are contained the two *Temperate Zones*, each being about 43 degrees broad.

44. There

44. There are likewise other divisions of the earth, called *Climates*, which are of very unequal breadths, from being regulated by the different lengths of time between the rising and setting of the sun, in the longest day of the different places. From the equator to latitude 66½ north and south, a climate is constituted by the difference of half an hour in the length of the longest day; and from each polar circle to the pole, by a calendar month. There are 24 climates between the equator and each polar circle, and six between each polar circle and its pole, making in all 30 north and 30 south. Upon the equator, the time between the sun's rising and setting is always twelve hours, and on the polar circles the longest day is 24 hours; the latitudes of the climates in the intermediate spaces, each of which has its longest day half an hour longer than that next nearer to the equator, together with the rest, are inserted in the following table, from Guthrie's Geographical Grammar.

Cli.

Clim.	Latit. D.	Latit. M.	Breadth D.	Breadth M.	Lon. Day H.	Lon. Day M.	Names of Countries and remarkable Places situated in every Climate north of the Equator.
1	8	25	8	25	12	30	I. Within the first Climate lie the Gold and Silver Coast in Africa; Malacca, in the East Indies; Cayenne and Surinam, in Terra Firma, S. Amer.
2	16	25	8		13		II. Here lie Abyssinia, in Africa; Siam, Madrass, and Pondicherry, in the East Indies; Straits of Darien, between N. and S. Amer.; Tobago, Granades, St. Vincent, and Barbadoes in the W. Ind.
3	23	50	7	25	13	30	III. Contains Mecca, in Arabia, Bombay, part of Bengal, in the East Indies; Canton, in China; Mexico, Bay of Campeachy, in N. America; Jamaica, Hispaniola, St. Christophers, Antigua, Martinico, and Guadalupe, in the West Indies.
4	30	25	6	30	14		IV. Egypt, and the Canary Islands, in Africa; Delly, capital of the Mogul Empire, in Asia; Gulph of Mexico, and East Florida, in N. America; the Havanna, in the West Indies.
5	36	28	6	8	14	30	V. Gibraltar, in Spain; part of the Mediterranean sea; the Barbary coast in Africa; Jerusalem; Ispahan, capital of Persia; Nankin, in China; California, New Mexico, West Florida, Georgia, and the Carolinas, in N. America.
6	41	22	4	54	15		VI. Lisbon, in Portugal; Madrid, in Spain; Minorca, Sardinia, and part of Greece, in the Mediterranean; Asia Minor, part of the Caspian sea; Samarcand, in Great Tartary; Pekin, in China; Corea and Japan; Williamsburgh, in Virginia; Maryland, and Philadelphia, in N. America.
7	45	29	4	7	15	30	VII. Northern provinces of Spain; southern ditto of France; Turin, Genoa, and Rome, in Italy; Constantinople; and the Black sea, in Turkey; the Caspian sea, and part of Tartary; New York, Boston in New England, N. America.
8	49	01	3	32	16		VIII. Paris, Vienna, cap. of Germany; New Scotland, Newfoundland, and Canada, in N. Amer.
9	52	00	2	57	16	30	IX. London, Flanders, Prague, Dresden; Cracow, in Poland; southern provinces of Russia; part Tartary; north part of Newfoundland.
10	54	27	2	29	17		X. Dublin, York, Holland, Hanover, Warsaw in Pol. Labrador, and N. South-Wales, in N. Amer.
11	56	37	2	10	17	30	XI. Edinburgh, Copenhagen, Moscow, cap. of Russia.
12	58	29	1	52	18		XII. South part of Sweden, Tobolski, cap. of Siberia.
13	59	58	1	29	18	30	XIII. Orkney Isles, Stockholm, cap. of Sweden.
14	61	18	1	2[illegible]	19		XIV. Bergen, in Norway; Petersburgh, in Russia.
15	62	25	1	7	19	30	XV. Hudson's Straits, N. America.
16	63	22		57	20		XVI. Siberia, and the south part of W. Greenland.
17	64	06		44	20	30	XVII. Drontheim, in Norway.
18	64	49		43	21		XVIII. Part of Finland, in Russia.
19	65	21		32	21	30	XIX. Archangel, on the White Sea, Russia.
20	65	47		22	22		XX. Hecla, in Iceland.
21	66	06		19	22	30	XXI. Northern parts of Russia and Siberia.
22	66	20		14	23		XXII. New North Wales, in N. America.
23	66	28		[illegible]	23	30	XXIII. Davis's Straits, in ditto,
24	66	31		3	24		XXIV. Somoieda.
25	67	21			1 Month		XXV. South part of Lapland.
26	69	48			2 Months		XXVI. West-Greenland.
27	73	37			3 Months		XXVII. Zembla Australis.
28	78	30			4 Months		XXVIII. Zembla Bo e lis.
29	84	05			5 Months		XXIX. Spitsbergen, or East Greenland.
30	90				6 Months		XXX. Unknown.

SECT. IX.

45. The utmoſt boundary of ſight, with reſpect to land or water, is called the *Senſible Horizon*, which is repreſented on ſome modern globes by a ſmall braſs circle; but that diſtant part of the heavens, where the ſun and ſtars appear to riſe and ſet, is called the *Rational Horizon*, and is 90° diſtant from the *Zenith*, which is the point of the heavens directly over head; the oppoſite point to which is called the *Nadir*.

46. The rational horizon of artificial globes is repreſented by the broad paper circle, which has always half the artificial globe above, and half below, its ſurface, being 90°, or a fourth part of a circle diſtant from the zenith and nadir. It likewiſe bounds the verges of light and darkneſs; for the ſun's rays falling on any ſphere, illumine half its ſurface.

Every place on the earth has its peculiar ſenſible, as well as rational, horizon, for each place is the center and uppermoſt point of its peculiar circumſcribing circles. To obſervers, who at the ſame point of time are directly north and ſouth of each other, the ſun, moon, and ſtars, appear more or leſs diſtant from the zenith or the horizon; for every different de-

gree

gree of latitude muſt raiſe or depreſs the horizon in the north and ſouth points, and muſt likewiſe continue the elevation or depreſſion of celeſtial objects in a leſs proportion to the eaſt and weſt points of the horizon. Therefore, from the equator to the polar circles, the apparent rotation of the ſun, moon and ſtars, above the horizon, are ſeen obliquely, and ſhow more or leſs than half their circular revolutions in lofty or low courſes, according as they differ in diſtance from the zenith, when at their greateſt altitudes.

The conſtant change of declination in the ſun and moon, muſt neceſſarily cauſe the ſame alterations in the different ſpaces of time which they appear above the horizon to any place north or ſouth of the equator, as has juſt been ſhown, to proceed from different places which lie north and ſouth of each other, when a celeſtial object has particular declination.

The inhabitants of the polar circles, when the ſun is neareſt to their zenith, ſee it at noon, about 47 degrees above their horizon; and, at midnight, they ſee it in the horizon, only in the oppoſite point of the compaſs to that which it was on at noon, ſo that it does not ſet for the ſpace of a natural day. But when the ſun is furtheſt

furtheſt from their zenith, it does not riſe above their horizon for the ſpace of a natural day, and only appears in it at noon; at midnight it is depreſſed about 47 degrees below it.

As the equinoctical is the horizon to the poles, when the ſun appears to paſs from the firſt degree of Aries, to the firſt of Libra, it muſt continually be above the horizon of the north pole; and, *vice verſa*, to the ſouth pole. All places between the polar circles and the poles have the ſun above and beneath the horizon, at oppoſite times of the year, in gradation from twenty-four hours to ſix months; and as the ſun has equal declinations north and ſouth of the equator, at nearly oppoſite times of the year, it will cauſe two days in the year to be of the ſame length; and the days in ſummer to be of equal length with the nights in winter, and *vice verſa*.

In the ſpace of a year all places in each hemiſphere will have the ſun above and beneath the horizon, nearly equal ſpaces of time; and if a year be conſidered as divided into only two parts, ſummer and winter, it will be accounted ſummer in the northern hemiſphere, when the ſun has north declination; and winter

gree of latitude muſt raiſe or depreſs the horizon in the north and ſouth points, and muſt likewiſe continue the elevation or depreſſion of celeſtial objects in a leſs proportion to the eaſt and weſt points of the horizon. Therefore, from the equator to the polar circles, the apparent rotation of the ſun, moon and ſtars, above the horizon, are ſeen obliquely, and ſhow more or leſs than half their circular revolutions in lofty or low courſes, according as they differ in diſtance from the zenith, when at their greateſt altitudes.

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ter at the ſame time in the ſouthern hemiſphere; and *vice verſa.*

47. On the horizon of globes there are generally four concentric circles, the outermoſt of which is generally formed by the twelve months divided into days. In the next inner circle are the ſigns of the ecliptic, with their names and characters, divided into degrees, &c. and ſeverally placed oppoſite to the days to which they correſpond. One of the other circles is conſtituted by the 32 points of the compaſs, from which may be ſeen, in a particular rectification of the globe, the point on which the ſun, &c. riſe or ſet, or are on at any time, with reſpect to the latitude of the place the globe is rectified for.

The remaining circle is numbered into four quadrants, beginning at the eaſt and weſt points, and increaſing to the north and ſouth points. Theſe numbers ſhow how many degrees from the eaſt and weſt points the ſun, &c. riſe or ſet, or bear on at any time when above or beneath the horizon. Either the points of the compaſs, or theſe numbers, when they reſpect the riſing or ſetting of celeſtial objects, are called *Amplitudes*, and are ſaid to be north or ſouth, according to their bearing; and the point of the

the compaſs, or numbers, ſhow how much the amplitude is. By comparing the numbers with the points of the compaſs, it will be ſeen that one point contains $11\frac{1}{4}$ degrees, which is the 32d part of 360.

48. The amplitudes change their name to *Azimuths*, when they reſpect the bearing of objects above the horizon. On the horizon of ſome globes, the azimuths are begun to be reckoned on each ſide from the ſouth to the north. Circles paſſing from the zenith to the horizon, are called *Azimuths*, or *Vertical Circles*; and thoſe which paſs through the eaſt and weſt points, are called the *Prime Verticals*.

49. The Angle of Poſition between two places, is the angle formed between the meridian of one of the places, and a vertical circle paſſing from the zenith through the other place.

The length of the arch of a great circle of a ſphere, contained between the opening of two other great circles of the ſame ſphere, is at the diſtance of 90 degrees from the interſection of the two great circles, the meaſure of their angle or opening; therefore, the horizon will meaſure the diſtance between the vertical circle of one place, and the meridian of another.

All great circles of a ſphere biſect each other.

By means of ſuch great circles of, and belonging to the globe, as are graduated into degrees, &c. and the quadrant of altitude, an appendage of the globe, hereafter deſcribed, the ſolution of ſpherical triangles may be performed. A ſpherical triangle, as may be deduced from the foregoing, is formed by three arches of three great circles.

50. The bearing of places ſignifies the point of the compaſs, which one place bears on with reſpect to another.

51. Parallels of Altitude, called alſo *Almacanters*, are circles parallel to the rational horizon of any particular zenith.

52. The Azimuths and Altitudes, or heights of objects above the horizon, are ſhown by a thin flexible ſlip of braſs, accommodated to the ſize of the globe, called a *Quadrant of Altitude*; one of its edges is graduated into 90 degrees, reckoned towards a nut and ſcrew, which it has to fix it on the braſs meridian to the zenith of any horizon: if numbers be continued downward, beneath the quadrant, they ſerve to ſhew the depreſſion of the ſun, &c. when beneath the

the horizon. The quadrant of altitude, by its motion from the zenith round the body of the globe, will, by its divisions, shew the several small circles, called, Almacanters, or Parallels of Altitude.

53. The sun causes twilight when less than 18 degrees below the horizon: the time of its continuance, as well as the sun's, &c. appearance above the horizon to the inhabitants between the equator and polar circles, is shown by an hour circle, which is commonly a circle of brass, graduated into twice 12 hours, agreeable to the time which the earth takes to revolve; the upper 12, or that toward the north, denotes noon, and the lower 12 midnight. A circle below the horizon, at the distance of 18 degrees, is called the *Crepusculum Circle*.

The index to the hour circle is moved by the globe, and consequently must point out time proportioned to the earth's motion, or of the continuance of celestial objects above the horizon, which, from its motion, appear to rise, culminate, and set. On some modern globes the equator is made the hour circle, from affording the largest scale; indexes are then placed on a wire over the equator.

SECT. X.

54. To all places between the polar circles and the poles, the ſun riſes and ſets in the ſpace of 24 hours, when the part of the arch of declination which the ſun is on at midnight, is at a greater diſtance than 90 degrees, but while leſs, the ſun muſt continue above the horizon; and when it is at a greater diſtance than 90° at noon, it cannot riſe at all to them. A rational ſpeculation of different ſituations of the globe, with reſpect to the horizon, will further illuſtrate this matter. Suppoſe then either of the poles to incline towards the horizon, it is evident that all, or ſome of the parallels to the equator between the tropics, muſt either be above the horizon, below it, or cut by it in unequal ſegments, according as it is more or leſs inclined; therefore the ſun, which appears to deſcribe, nearly, parallels to the equator every day, muſt at certain places and times, appear more than 24 hours above the horizon; at certain places and times leſs; and at certain places and times, it muſt diſappear longer than 24 hours beneath the horizon. The globe in the poſition juſt deſcribed, is called an *Oblique Sphere*, becauſe the

the parallels bear obliquely to the horizon: and as each place is the zenith to its peculiar horizon, the nearest pole must be between the zenith and horizon to all places, but those upon the equator and the pole itself.

55. At the equator, the poles, from being 90° distant, must be in the horizon: all the parallels to the equator will be divided in two equal parts, and will be at right angles to the horizon, from which, this position is called a *Right Sphere*: and as all the diurnal and nocturnal arches are equal, the days and nights at the equator must be always equal.

56. At each pole, the equinoctial, from being 90° distant, must be in the horizon, and consequently all parallels to the equator must likewise be parallel to the horizon, from which this position is called a *Parallel Sphere*; and as to this position, half the ecliptic is continually above and half below the horizon, there can be but one day and night throughout the year to the inhabitants (if any) of the poles; the sun when in the equinoctial must move round their horizon, and when nearer their zenith, its altitude must be equal to its declination.

 SECT.

SECT. XI.

57. It has been before obſerved, that the equator is numbered into 360 degrees, beginning from, and ending in Aries; that when the ſun is in the equinoctial, it cauſes equal days and nights, *i. e.* it riſes at ſix o'clock in the morning, and ſets at ſix o'clock in the evening, and that in all latitudes when the ſun has declination, it riſes and ſets before or after ſuch time. Now, this difference of time in the riſing and ſetting of the ſun, &c. conſidered either as time or degrees, is called the *Aſcenſional Difference*, as being the difference between the right and oblique aſcenſion.

58. By the *Right Aſcenſion* of the ſun, &c. is meant that degree of the equinoctial, reckoned from Aries, which comes to the meridian with the ſun's, &c. center, and is the ſame which aſcends above the horizon with it, or any other celeſtial body reſpectively, in a right ſphere.

59. By the *Oblique Aſcenſion* is meant that degree of the equinoctial, which is cut by the horizon at the ſame time that the ſun's centre, &c. is on it at riſing, in all latitudes when the ſun, &c. has

has declination. The Oblique Defcenfion of any celeftial object means the degree of the equinoctial which is cut when it fets, under the fame circumftances.

SECT. XII.

As the fun caufes the fhadows of all bodies oppofed to its light to fall in oppofite directions to its rays, the inhabitants of the earth in particular places will have their noon fhadows projected differently: when the fun is vertical to any inhabitants between the tropicks, they have no fhadow, and are called *Afcii*; but when the fun's declination is not the fame as their latitude, their fhadows will be projected north when the fun is fouth of them at noon, and fouth when the fun is north of them at noon; they are then called *Amphifcii*.

Between the tropicks and polar circles, fhadows at noon will be projected only one way; in north latitude northward, and in fouth latitude fouthward; the inhabitants, therefore, of the temperate zones are called *Heterofcii*: the fame will hold good for the inhabitants of the polar circles at noon, when the fun rifes and fets in the fpace of 24 hours; but as at certain times

the ſun remains above their horizon longer than a natural day, it muſt appear to move round them, which muſt neceſſarily cauſe their ſhadows likewiſe to move round them; they are therefore called *Periſcii.*

SECT. XIII.

60. The inhabitants of different hemiſpheres who have equal latitude, and are on the ſame meridian, conſidered with reſpect to ſituation only, are called *Antæci*; they have oppoſite ſeaſons of the year, but preciſely the ſame hours of the day. Places on the ſame parallel of latitude, but on oppoſite meridians, are called *Periæci*; they have the ſame ſeaſons of the year, but oppoſite hours. Two places diametrically oppoſite, *i. e.* in different hemiſpheres of equal latitudes, but on oppoſite meridians, are called *Antipodes*; they have oppoſite ſeaſons, and oppoſite hours.

SECT. XIV.

Of the Atmoſphere.

61. The air with which the earth is ſurrounded, and which is a part of itſelf, is called the *Atmoſphere*;

mosphere: it gravitates towards the earth, and is most dense near its surface; at greater heights it gradually becomes more rare. It is a thin fluid, capable of being expanded by heat, and condensed by cold, it may also be compressed by force. At the height of two miles it is seldom dense enough to reflect light. With respect to weight, the proportion that any space of air near the earth's surface, bears to a like space filled with water, is about as 1 to 1200. Air has the property of water, in pressing equally up, down, and on all sides; in supporting particles of matter lighter than itself, and likewise in making bodies seen through it appear larger and higher than they really are. This property of the Atmosphere is called *Refraction*, and ends in the zenith; near the horizon its power is greatest, from our viewing objects in that situation through the greatest medium of it.

The Atmosphere, by reflecting the solar rays, makes the whole heavens appear luminous before the sun rises, and after it sets, so that the light and darkness do not come on suddenly, but by degrees; this illumination of the Atmosphere is what we call *Twilight*; we have the benefit of it while the sun is within 18 degrees of the horizon; and hence it is, that during that part

of

of the year, in which the ſun does not deſcend 18 degrees below the horizon in the latitude of London, there is a continual twilight from ſun-ſetting to ſun-riſing, which is from about the time in which the ſun appears in the 5th degree of Gemini, till he appears in the 12th degree of Cancer; that is, from the 26th of May to the 18th of July.

Some of the ancient philoſophers conſidered air as the firſt principle of all things, from its vivifying qualities, its being the vehicle of light and ſound, ſuffering vapours more ſubtile than itſelf to ariſe and form clouds; and from its ſuſceptibility of condenſation and rarefaction, by which the particles of different qualities which have ariſen from ſubſtances, are put in conſtant motion, cauſing thereby wind, rain, ſnow, hail, thunder, and lightning.

SECT. XV.

Of the Sky.

62. The *azure colour of the ſky*, Sir I. Newton attributed to vapours beginning to condenſe, and

and which have acquired consistence enough to reflect the most reflexible rays. Monsieur de la Hire attributed it to our viewing the dark space beyond the regions of the atmosphere, through a white or lucid one, viz. the air illumined by the sun.

SECT. XVI.

Of the Courses of Winds.

63. The *general Course of Wind* is occasioned by the action of the sun on the atmosphere.

Within and near the tropicks, winds are more certain than elsewhere, from being more strongly and regularly influenced by the sun's rays. Within particular limits of the ocean, their courses are known to a certainty.

On and near land, the nature of soils, from which vapours arise, the position of high mountains, and the bending of shores, cause the course of wind to be variable and uncertain.

By the earth's diurnal motion, the parts of the atmosphere which successively receive the most

moſt direct rays of the ſun, become ſo expanded, as to cauſe the air to the eaſtward to be conſtantly ruſhing towards the weſt; and from its tendency to reſtore an equilibrium it occaſions a conſtant eaſt wind. This wind is called the *General Trade Wind*; it blows in the Atlantick, the Pacifick, and Southern Oceans, between the latitudes of about 30 degrees north and ſouth. Theſe winds have trifling changes, according as the ſun has north or ſouth declination, ſo that on the north ſide of the equator, they for the moſt part blow from the north-eaſt; and on the ſouth ſide of the equator, from the ſouth-eaſt; about the equator, for the moſt part, they blow due eaſt.

In the Indian ocean, there are periodical winds, called *Monſoons*: they blow ſix months in one direction, and the other ſix months in the oppoſite direction: the change of their direction, which is near the Vernal and Autumnal Equinoxes, (i. e. when the ſun is in Aries and Libra), is accompanied with violent ſtorms of wind, thunder, and lightning. The Monſoons are denoted on the terreſtrial globe by twelve arrows, with the months in which they have each peculiar direction. Voyagers to India are obliged to time their voyages ſo as to benefit by theſe winds;

winds; for if they lose the advantage, they are obliged to wait for the returning Monsoon.

On and near the coast of Guinea, in Africa, the winds blow almost always from the west and south-west points. Between the longitude of Cape Verd, and the easternmost of the Cape Verd islands, there is a tract of sea in which there is a perpetual calm with respect to wind; but the thunder and lightning there is terrible, and it has acquired the name of *the Rains*, from the great fall of water. In Great Britain, and many other places, the wind blows oftener from the west than any other point.

Ships in their passage from England to America, and the West Indies, generally endeavour to obtain about an equal latitude with the place they are bound to, and then sail directly west. When bound for New York, they generally sail by the Azores, or Western Islands, and when to Virginia or Carolina, by the Madeiras. Our West India traders call this the *Upper Course*; and when they intend to gain the advantage of the trade wind, they sail to the southward as far as latitude 23 or 16 degrees, and frequently touch at Antigua, when bound for Jamaica.

The

The Spanish Galeons and the *Flota* from Spain keep between latitudes 15 and 18 degrees, and in their return to Spain in about 37 degrees.

The velocity of wind is various from one to 50 or 60 miles an hour; a common brisk gale is about 15 miles an hour.

SECT. XVII.

Of the Celestial Globe.

64. The *Celestial Globe* has the several constellations delineated on its surface.

It revolves on an axis, as the Terrestrial Globe does; the points of which, at the surface of the globe, are the poles of the equinoctial.

The Equinoctial divides the Celestial Globe into two equal parts, northern and southern, with respect to the declination of celestial objects.

65. The *declination of celestial objects* means their distance from the equinoctial.

The

The Ecliptic divides the Celeſtial Globe into two equal parts, northern and ſouthern, with reſpect to the latitude of celeſtial objects.

66. The latitude and longitude of celeſtial objects bear the ſame relation to the ecliptic; and a circular line, which paſſes from the poles of the ecliptic through the firſt point of Aries, as places on the terreſtial globe do to the equator and the meridian, from which longitude is reckoned; ſo that the *latitude of a celeſtial object* means its diſtance from the ecliptic towards the poles of the ecliptic, and the *longitude of a celeſtial object* means its diſtance, in degrees, &c. upon the ecliptic, from the firſt point of Aries. There are commonly circular lines drawn from the poles of the ecliptic, through the firſt degree of each of the twelve ſigns.

The ſun has no latitude, being always in the ecliptic; nor do we uſually ſpeak of its longitude, but rather of his place in the ecliptic.

67. The Ecliptic, on the Celeſtial Globe, is encompaſſed, to the extent of eight degrees on each ſide, with circles, commonly drawn a degree apart: within this breadth of ſixteen degrees, which is called the *Zodiac*, the planets con-

ſtantly revolve, and the twelve conſtellations belonging to the ecliptic are contained.

68. To have a juſt repreſentation from the Celeſtial Globe of the face of the heavens, with reſpect to the fixed ſtars, the eye may be ſuppoſed to be placed in the center, and from thence to obſerve the ſtar in a concave hemiſphere, at the ſurface, as if the globe were tranſparent. When the globe is placed in a proper poſition for repreſenting all the viſible fixed ſtars above the horizon, to any place at a particular time, a ſtar in the heavens, at ſuch time, lies nearly in a direct line from the center of the globe, through the ſtar on its ſurface.

The Celeſtial Globe turns within a braſs meridian, as the Terreſtrial Globe does: it has likewiſe an hour circle, and is encompaſſed in the ſame manner with a like frame, to repreſent the horizon; and it has a quadrant of altitude belonging to it, for the purpoſe of meaſuring the heights of objects above the horizon, or their azimuths, at any time.

The terms amplitude, azimuth, zenith, nadir, right aſcenſion, &c. &c. have been already defined in treating of the Terreſtrial Globe.

A ſtar

69. A ſtar is ſaid to riſe or ſet *coſmically* when it riſes with the ſun, or ſets when the ſun riſes.

70. A ſtar is ſaid to riſe or ſet *achronically*, when it riſes or ſets at the ſame time that the ſun ſets.

71. A ſtar is ſaid to riſe or ſet *heliacally*, according as its appearance in emerging from the ſun's beams, is ſeen at the riſing or ſetting of the ſun.

72. *The Fixed Stars*, on account of their apparent various magnitudes, have been diſtributed into different claſſes, the firſt claſs being thoſe which appear largeſt; theſe, however, appear almoſt all different in luſtre and ſize, as do likewiſe thoſe of the other claſſes. Some ſtars, from being in an intermediate ſtate between two claſſes, are aſſigned to neither, but are reckoned to be between the two. Stars of the ſixth magnitude can barely be ſeen by the naked eye. Thoſe which cannot be diſcerned but by the help of glaſſes, are called *Teleſcopic Stars*. Each claſs of ſtars contains a greater number than that next higher which precedes it. The difference in the apparent magnitudes of the fixed ſtars may probably ariſe, not only from a diverſity in their real magnitudes, but

E prin-

principally from their different diſtances. Thoſe ſtars not reduced into conſtellations, are called *Informes*, or *Unformed Stars*.

73. The *Galaxy*, *Via Lactea*, or *Milky-way*, in the heavens, is a tract of a whitiſh colour, and conſiderable breadth, which runs through a great ſpace in the heavens. Caſini, a French aſtronomer, cotemporary with Newton, thought it to be compoſed of numbers of ſtars too minute to be ſingly ſeen, but ſo cloſely diſpoſed as to give a luminous appearance to the Via Lactea; but as the beſt glaſſes do not ſhew any ſtars within this tract, Caſini's opinion is moſtly rejected, and it is more probably imagined, that the Via Lactea is compoſed of large ſpaces in the æther, through which a lucid medium is diffuſed. Although moſt of theſe ſpaces are but a few minutes of a degree in breadth, yet ſince they are among the fixed ſtars they are probably ſpaces not leſs than our whole ſolar ſyſtem; in them there ſeems to be a perpetual, uninterrupted day.

GEOGRA-

GEOGRAPHY.

CHAP. I.

The extreme Limits of the Continents of Europe, Asia, Africa, and America, with respect to Latitude and Longitude.

EUROPE is situated between 37° 55' and 71° 10'* of north latitude, and between 10° of west, and 60° of east longitude (from the meridian of London): it is in its greatest extent

* Greenland, as being very imperfectly known, is not included within the above extent. East Greenland, called also New Greenland, and Spitsbergen, is supposed to be united in its northern parts to West Greenland. East Greenland, according to Guthrie, lies between 76 and 80 degrees of north latitude, and between 10 and 11 of east longitude; and West Greenland between 60 and 70 degrees of north latitude, and between the meridians of London, and 50 degrees of west longitude.

 from

from south to north about 2300 miles, and from west to east about 2000.

Asia is situated between the Equator and 76° of north latitude, and between 25° and 179° 45′ of east longitude: it is in its greatest extent from south to north about 5200 miles, and from west to east about 4380.

Africa is situated between 34° 29′ of south, and 37° 5′ of north latitude, and between 17° 27′ west, and 52° 17′ of east longitude: it is in its greatest extent from south to north about 4900 miles, and from west to east about 4000.

America is situated between 56′ of south, and 77° 30′ of north latitude, and between 35° 10′, and 136 degrees of west longitude: it is in its greatest extent from south to north about 9200 miles, and from east to west about 3400.

CHAP.

CHAP. II.

Oceans.

The *Northern Ocean* extends from the northern ſhores of Europe, Aſia, and America, towards the North Pole.

The *Southern Ocean* extends from the ſouthern ſhores of Africa and ſouth America, towards the South Pole.

The *Pacific*, or *Eaſtern Ocean*, flows between the eaſtern ſhores of Aſia and the weſtern ſhores of North America; its greateſt width is about 10,000 miles.

The *Atlantic*, or *Weſtern Ocean*, flows between Europe, the northern ſhores of Africa, and North America; its greateſt width is about 4500 miles.

The *Indian Ocean* lies between the eaſtern ſhores of Africa and the Eaſt Indies, (which lie ſouth of the continent of Aſia); its greate width is about 4000 miles.

Many of the branches of the abovementioned ocean, have names given to them from the ſhores on which they flow, as the Britiſh Ocean, the Ethiopic Ocean, &c.

CHAP. III.

The Boundaries and Grand Divisions of Europe.

Europe is bounded on the North, by the Northern Ocean; on the South, by the Mediterranean Sea, which divides it from Africa; on the East*, by Asia; and on the West, by the Atlantic Ocean. It is principally divided into the following Empires, Kingdoms, States, &c.

	Kingdoms, &c.	Length.	Breadth.	Chief Cities	Dist. & Bearing from London.	Religion
Isle of Gr. Brit.	Eng. & Wales	360	300	London	* *	Protestants.
Isle of Gr. Brit.	Scotland	300	150	Edinburgh	400 N.	Ditto.
	I. of Ireland	285	160	Dublin	270 N. W.	Prot. & Pap.
	Denmark	240	180	Copenhagen	500 N. E.	Protestants.
	Norway	1000	300	Bergen	540 N.	Ditto
	Sweden	800	500	Stockholm	750 N. E.	Ditto.
	Russia	1500	1100	Petersburgh	1140 N. E.	Greek Ch.
	Poland	700	680	Warsaw	760 E.	Pap. & Prot.
	K. of Prussia's Dom.	Uncertain from Conquests.		Berlin	540 E.	Protestants.
	Germany	600	500	Vienna	600 E.	Pap. & Prot.
	Bohemia	300	250	Prague	600 E.	Papists.
Netherlands.	United Provin.	150	100	Amsterdam	180 E.	Protestants.
Netherlands.	Flanders	200	200	Brussels	180 S. E.	Papists.
	France	600	500	Paris	200 S. E.	Papists.
	Spain	700	500	Madrid	800 S.	Papists.
	Portugal	300	100	Lisbon	850 S. W.	Papists.
	Switzerland	260	100	Bern	420 S. E.	Prot. & Pap.

* From the south to the north it is divided from Asia by the Levant Sea, the Archipelago, the Hellespont, the Sea of Marmora, the Bosphorus, a part of the Black Sea, and the Sea of Asoph, the River Don, and a line drawn from it to the River Tobol, and from thence to the River Oby, which falls into the Northern Ocean.

Italy,

	Kingdoms, &c.	Length.	Breadth.	Chief Cities.	Dist. and Bearing from London.	Religions.
Italy.	Popedom.	240	120	Rome	820 S. E.	Papists
Italy.	Sever. principal States.	Savoy, Chambetry,	Piedmont, Turin,	Venice, Venice,	Genoa, Genoa,	Tuscany, &c. Florence.
Italy.	Naples	280	120	Naples	870 S. E.	Papists
Italy.	I. of Sardinia	135	57	Cagliari	830 S. E.	Papists
	Hungary	300	200	Buda	780 S. E.	Papists
Turkey in Europe.	Danubian Provinces	600	420	Constantinople	1320 S. E.	
Turkey in Europe.	Lit. Tartary	380	240	Caffa	1500 E.	
Turkey in Europe.	Greece	400	240	Athens	1360 S. E.	

Exclusive of Great Britain, Ireland, and Sardinia, Europe contains the following principal Islands.

Situation.	Islands.	Chief Towns.	Subject to.
In the Northern Ocean	Iceland	Skalholt	Denmark
South of Iceland	Faro Islands		Ditto
North of Scotland	Orcades or Orkney Islands		Great Britain
N. E. of the Orcades	Shetland Islands		Great Britain
West of Scotland	Hebrides, or Western Islands		Great Britain
In the Irish Sea	Isle of Man		Great Britain
S. of the Isle of Man	Isle of Anglesea		Great Britain
English Channel long. 1 20′	Isle of Wight		Great Britain
English Chan. near the French coast	Jersey, Guernsey, Alderney, and Sark		Great Britain
In the Baltic Sea	Zealand, Funen, Alsen, Falster, Langland, Laland, Femeren, Mona, and Bornholm		Denmark
In the Baltic Sea	Gothland, Oeland, Aland, Rugen		Sweden
In the Baltic Sea	Osel Dagho,		Russia
In the Baltic Sea	Usedom and Wollin		Prussia

The Scilly Islands are a cluster of dangerous rocks, lying about thirty miles west of the most southerly part of England, i. e. off the Land's End, in Cornwall.

Situation.	Islands.	Chief Towns.	Subject to
West Coast of France.	Ushant, Belle Isle, Rhè, and Oleron.		France.
Mediterranean Sea.	Ivica,	Ivica,	Spain.
	Majorca,	Majorca,	Ditto.
	Minorca,	Port Mahon,	France.
	Corsica,	Bastia,	Ditto.
	Sicily,	Palermo,	King of Naples.
Adriatic, or Gulf of Venice.	Lusiena, Corfu, Cephalonia, Zant, and Leucadia,		Venice.
Archipelago.	Candia, Negropont, Lemnos, Scyras, Paras, Cerigo, Santorin*, &c. &c. being part of ancient and modern Greece.		Turkey.

* Tenedos, Mytelene, Patmos, Scio, Samos, Rhodes, and Cyprus, islands in the Archipelago and Levant Sea, from not coming within the limits of Europe, are mentioned with the Asiatic islands.

CHAP.

CHAP. IV.

The Boundaries and Grand Divisions of Asia.

Asia is bounded on the North, by the Northern Ocean; on the South, by the Indian Ocean; on the East, by the Pacific Ocean; and on the West, by the Red Sea, and the Isthmus of Suez, (which part it from Africa), the Mediterranean Sea, the western parts of the Archipelago, Black Sea, Sea of Asoph, and Europe.

	Nations, &c.	Length.	Breadth	Chief Cities.	Dist. and Bearing from Lond.	Religions.
Tartary.	Russian	The limits of these different parts are not known.		Tobolsk		Chr. & Pagans
	Chinese			Chynian		Pagans
	Mogulean			Tibet		Ditto
	Independent			Samarcand		Ditto
	China	1440	1000	Pekin	4320 S. E.	Ditto
	Mogul's Emp.	2000	1500	Delhi	3720 S. E.	Mah. & Pagans
	India	2000	1000	Siam or Pegu	5040 S. E.	Pagans
	Persia	1,300	1100	Ispahan	2460 S. E.	Mahometans
Turkey in Asia.	Part of Arabia	1300	1200	Mecca	2640 S. E.	Ditto
	Syria	270	160	Aleppo	1860 S. E.	Chr. & Mah.
	Holy Land	210	90	Jerusalem	1920 S. E.	Ditto
	Natolia	750	308	Bursa, Smyrna	1440 S. E.	Mahometans
	Diarbec, or Mesopotamia	560	310	Bagdat	2160 S. E.	Mah. & Chr.
	Turcomania	360	300	Erzerum	1860 S. E.	Ditto
	Georgia	300	260	Teflis	1920 E.	Ditto

Asia contains the following principal Islands.

Situation.	Islands.	Towns.	Trade with, or belong to.
In the Mediterranean and Levant Seas.	Tenedos, Mytelene, Patmos, Scio, Samos, Rhodes, and Cyprus,		Turkey.
From the Pacific Ocean to the Indian Ocean.	The Japanese Isles,	Jeddo,	Dutch.
	The Ladrones,	Guam,	Spain.
	Formosa,	Taiouanfou,	China.
	The Philippines,	Manilla,	Spain.
	The Molucca or Clove Islands,	Victoria Fort,	Dutch.
	The Banda, or Nutmeg Islands,	Lantor,	Dutch.
	Amboyna,	Amboyna,	Dutch.
	Celebes,	Macassar,	Dutch.
	Gilolo, &c.	Gilolo,	Dutch.
	The Sunda Islands, viz.		
	Borneo,	Borneo & Caytongee,	All Nations.
	Sumatra,	Achen & Bencoolen,	Eng. & Dut.
	Java,	Batavia and Bantam,	Dutch.
From Malacca towards the Bay of Bengal.	The Andaman and Nicobar Islands,	Andaman and Nicobar,	All Nations.
S. E. of the Coromandel Coast.	Ceylon,	Candy,	Dutch.
S. W. & S. of the Malabar Coast.	The Maldives, and Lackdives,	Caridon,	All Nations.
N. of the Malabar Coast.	Bombay,	Bombay,	English.
	The Kurile Isles, and those in the Sea of Kamschatka.		Russia.

CHAP.

CHAP. V.

The Boundaries and Grand Divisions of Africa.

Africa is bounded on the North by the Mediterranean and Levant Seas; on the South by the Southern Ocean; on the East by the Isthmus of Suez, the Red Sea, and the Indian Ocean; and on the West by the Atlantic and part of the Southern Ocean.

	Nations.	Length.	Breadth	Ch. Towns.	Dist. and Bearing from London.	Religions.
States of Barbary.	Morocco	500	480	Fez	1080 S.	Mahometans.
	Algiers	480	100	Algiers	920 S.	Ditto.
	Tunis	220	170	Tunis	990 S. E.	Ditto.
	Tripoli	700	240	Tripoli	1260 S. E.	Ditto.
	Barca	400	300	Tolemeta	1440 S. E.	Ditto.
	Egypt	600	250	Grand Cairo	1920 S. E.	Mahometans.
	Biledulgerid	2500	350	Dara	1565 S.	Pagans.
	Zaara	2400	600	Tegessa	1840 S.	Pagans.
	Negroland	2200	840	Madinga	2500 S.	Pagans.
	Guinea	1800	360	Benin	2700 S.	Pagans.
Upper Ethiopia.	Nubia	940	600	Nubia	2418 S. E.	Mah. and Pag.
	Abyssinia	900	800	Gondar	2880 S. E.	Christians.
	Abex	540	130	Doncala	3580 S. E.	Chr. and Pag.
	Lower Ethiopia but little known					
Lower Guinea	Loango	410	300	Loango	3300 S.	Chr. and Pag.
	Congo	540	420	St. Salvador	3480 S.	Chr. and Pag.
	Angola	360	250	Loando	3750 S.	Chr. and Pag.
	Benguela	430	180	Benguela	3900	Pagans.
	Mataman	450	240	No Towns	* * *	Pagans.
	Ajan	900	300	Brava	3702 S. E.	Pagans.
	Zanguebar	1400	350	Melinda or Mosambique	4440 S. E.	Pagans.
	Monomotapa	960	660	Monomotapa	4500 S.	Pagans.
	Monemugi	900	660	Chicova	4260 S.	Pagans.
	Sofala	480	300	Sofala	4600 S. E.	Pagans.
	Terra de Nat.	660	350	No Towns	* * *	Pagans.
	Caffraria, or Hottentots	780	660	Cape of Good Hope	5200 S.	Pagans.

Africa contains the following principal Iſlands.

Situation.	Iſlands.	Towns.	Belong to, or trade with.
In the Indian Ocean at the entrance of the Red Sea	Babelmandel Zocotra	Babelmandel Calanſia	All Nations
Indian Ocean	Comora Iſles	Joanna	Ditto
Ditto	Madagaſcar	St. Auſtin	Ditto
Ditto	Mauritius	Mauritius	French
Ditto	Bourbon	Bourbon	Ditto
Atlantic	St. Helena	St. Helena	Engliſh
Ditto	Aſcenſion		Uninhabited
Ditto	St. Matthew		Ditto
Ditto	St. Thomas	St. Thomas	Portugueſe
Ditto	Anaboa	Anaboa	Ditto
Ditto	Prince's Iſland & Fernandopo		Ditto
Ditto	Cape Verd Iſlands	St. Domingo	Ditto
Ditto	Goree	Fort St. Michael	French
Ditto	Canaries	Palma & St. Chriſtopher	Spaniſh
Ditto	Madeiras	Santa Cruz, & Funchal	Portugueſe
Ditto, nearly at an equal diſtance from Europe, America, and Africa.	Azores, or Weſtern Iſles	Angra	Ditto

CHAP.

CHAP. VI.

The Boundaries and Grand Divisions of America.

America is bounded on the North by the Northern Ocean; on the South by the Southern Ocean; on the East by the Pacifick, and part of the Southern Ocean; and on the West by the Atlantick, and part of the Southern Ocean.

North America.

Provinces, States, &c.	Length.	Breadth.	Ch. Towns.		Belongs to
Quebec	800	200	Quebec	Bearing from London from the W. to S.W. distances from about 2750 to upwards of 5000 miles.	Gr. Britain
New Scotland	350	250	Halifax		Ditto
New England	550	200	Boston		United States
New York	300	150	New York		Ditto
New Jersey	160	60	Perth Amboy		Ditto
Pensylvania	300	240	Philadelphia		Ditto
Maryland	140	135	Annapolis		Ditto
Virginia	750	240	Williamsburgh		Ditto
North Carolina			Wilmington		Ditto
South Carolina	700	380	Charles Town		Ditto
Georgia			Savannah		Ditto
East Florida			St. Augustine		Spain
West Florida	500	440	Pensacola		Ditto
Louisiana	Undetermined		New Orleans		Ditto
New Mexico and			St. Fee		Ditto
California	2000	1600	St. Juan		Ditto
Mexico, or New Spain	2000	600	Mexico		Ditto

Rhode Island and Long Island belonging to the United States.

South America.

Nations.	Length.	Breadth.	Ch. Towns.		Belongs to
Terra Firma	1400	700	Panama	Bearing from London S. Westerly, distances from 4650 to 8600 miles.	Spain
Peru	1800	500	Lima		Ditto
Amazonia	1200	960	Para		Ditto
Guiana	780	480	Surinam and Cayenne		Dutch French
Brazil	2500	700	St. Sebastian		Portugal
Paraguay, or La Plata	1500	1000	Buenos Ayres		Spain
Chili	1200	500	St. Jago		Ditto
Terra Magellanica, or Patagonia	700	300	No Towns		Ditto

The

The Principal Islands of North America and the West Indies.

	Islands.	Length.	Breadth.	Towns.	Belongs to
In the Gulph of St. Laurence.	Newfoundland	350	200	Placentia	Great Britain
	Cape Britain	110	80	Louisbourg	Ditto
	St. John's	60	30	Charlotte Town	Ditto
In the Atlantick.	The Bermuda isles	20,000 acres		St. George	Ditto
	Bahama isles	very numerous		Nassau	Ditto
West India Islands lying in the Atlantick, between N. and S. America.	Jamaica	140	60	Kingston	Ditto
	Barbadoes	21	14	Bridge Town	Ditto
	St. Christopher's	20	7	Basse Terre	Ditto
	Antigua	20	20	St. John's	Ditto
	Nevis and	each about 18 in		Charles Town	Ditto
	Montserat	circumference		Plymouth	Ditto
	Barbuda	20	12		Ditto
	Anguilla	30	10		Ditto
	Dominica	28	13		Ditto
	St. Vincent	24	18	Kingston	Ditto
	Granada	30	15	St. George's	Ditto
	Tobago	32	9		France
	Cuba	700	70	Havannah	Spain
	Hispaniola	450	150	St. Domingo	Spain and France
	Porto Rico	100	49	Porto Rico	Spain
	Trinidad	90	60		Ditto
	Margarita	40	24		Ditto
	Martinico	60	30	St. Peter's	France
	Guadaloupe	45	38	Basse Terre	Ditto
	St. Lucia	23	12		Ditto
	St. Bartholomew, Deseada, and Marigalante	very small			Ditto
	St. Eustatia	circum.	29	The Bay	Dutch
	Curassou	30	10		Ditto
	St. Thomas	circum.	15		Denmark
	St. Croix	30	10	Basse End	Ditto

Jamaica, the most distant of these Islands, except the western part of Cuba, is about 4700 Miles from London; the others, at a Medium, about 4000 Miles distance.

CHAP.

CHAP. VII.

Seas, Lakes, Bays, &c.

Seas, &c.	Situation.
British Sea.	BETWEEN Great Britain, Denmark, and the Netherlands.
English Channel.	Between England and France.
Straits of Dover.	Entrance from the British Sea into the Channel.
Irish Sea, or St. George's Channel.	Between Ireland, England, and Wales.
Bristol Channel.	South of Wales.
Cattegate, or Scaggerac Sea.	Between Sweden and Denmark.
The Sound.	Entrance into the Baltic from the Cattegate.
The Baltic Sea.	Between Sweden, Germany, and Prussia.
Gulf of Finland.	From the Baltic between Sweden and Russia.
Gulf of Bothnia.	From the Baltic on the coast of Sweden.
Zuyder Sea,	Flows to the middle of the United Provinces from the north; it has the islands Texel, Flie, Schelling, &c. at the entrance.
Bay of Biscay,	Flows on the north coast of Spain, and the west coast of France.
Straits of Gibraltar.	Entrance into the Mediterranean Sea from the Atlantic Ocean.
Mediterranean Sea.	Between Europe and Africa.
The Straits of Bonifacio,	Flow between the islands of Corsica and Sardinia.
Straits of Messina.	Between Italy and the Island of Sicily.
Gulf of Venice, or Adriatic Sea,	Between Italy and Turkey.
Ionian Sea.	Flows on the western coasts of Greece.

3 *Hellespont,*

Seas, &c.	Situation.
Hellespont,	Joins the Archipelago, or Egean Sea, to the Sea of Marmora; at the entrance of the Hellespont are two castles, called the Dardanelles.
Sea of Marmora, or the *Propontis.*	Near the entrance into the Black Sea.
Bosphorus of Thrace, or *Straits of Constantinople.*	Entrance into the Black Sea.
Black, or *Euxine Sea,*	Flows on the shores of Turkey in Europe, and Asia.
Straits of Kaffa.	Entrance into the Sea of Asoph, from the Black Sea.
Sea of Asoph, or *Palus Meotis,*	Flows on the shores of Little Tartary, and extends to the river Don.
Levant Sea.	Eastern part of the Mediterranean; it flows on the coasts of Egypt and Syria.
Caspian Lake,	Flows on the coasts of Western Tartary and Persia.
Ethiopian Sea.	Coast of Guinea, Africa.
Red Sea,	Flows between the coasts of Africa and Arabia.
Straits of Babelmandel.	Entrance into the Red Sea from the Indian Ocean.
Arabian Sea.	On the eastern coasts of Arabia.
Persian Gulf.	Between Persia and Arabia.
Gulf of Ormus.	Towards the entrance into the Persian gulf.
Gulf of Scindi.	East of the gulf of Ormus.
Gulf of Cambaya.	South of the gulf of Scindi.
Bay of Bengal,	Flows on the coasts of India.
Straits of Malacca.	Between Malacca and the island of Sumatra.
Straits of Sunda.	Between the islands of Sumatra and Java.
Gulf of Siam,	Flows on the coast of Siam, in India.
Gulf of Tonquin.	S. of China about lat. 20 N. long. 107 E.
Yellow Sea.	East of Pekin, in China.

Seas, &c.	Situation.
Sea of Korea.	East of the Yellow Sea.
Sea of Kamschatka.	Coast of Kamschatka, Siberia, most eastern part of the Russian Empire.
Waigat's Straits.	Between Nova Zembla and Russia, N. E. of the White Sea.
White Sea,	Flows from the Northern Ocean on the northern provinces of Russia in Europe.
Lake of Onega.	South of the White Sea.
Lake of Ladoga.	Between the gulf of Finland and the Lake of Onega.
Lake of Wenter.	S. W. part of Sweden.
Lake of Geneva.	By the south-westerly part of Switzerland.
Lake of Constance,	South of Swabia in Germany.
Lakes of Ireland and of *Scotland,*	Are numerous, but not very large.
Lakes of England,	Are but few, and those but small, the chief are, Soham-mere, Wittlesea-mere, and Ramsey-mere, in the isle of Ely, in Cambridgeshire.
Baffin's Bay, *Hudson's Bay,* *James's Bay,*	From the northern parts of America into the Continent.
Hudson's Straits,	Lead into Hudson's Bay.
Gulf of St. Lawrence.	Between the continent of North America, and the islands of Newfoundland and St. John.
Bay of Fundy.	Between New Scotland and New England.
Lakes of Canada.	West of New England and New York.
Straits of Bahama.	Between East Florida and the Bahama Islands.
Gulf of Mexico.	South part of North America, from the coast of Mexico to the cape of East Florida, extending from thence southward as far as the west of Cuba.
Apalaches Bay.	Lat. 29 N. long. 85 W.
Bay of Campeachy,	South of the gulf of Mexico, about lat. 22 N.

F Seas,

Seas, &c.	Situation.
Bay of Honduras.	North coast of Honduras, North America in about lat. 16.
Spanish Main.	South of the Isthmus of Panama.
Caribbean Sea,	Flows from the most western islands in the West Indies, to the north part of South America.
Gulf of Darien.	Between lat. 7 and 9 N. and long. 76 and 77 W.
Gulf of Maracaybo.	Lat. 10 N. long. 70 W.
Straits of Magellan.	Between Patagonia and the island of Terra del Fuego.
Straits of La Maire.	Between Terra del Fuego and Staten or States Island.
Gulf of California.	South-west part of North America, between lat. 24 and 32.
Bay of Panama.	South of the Isthmus of Panama, lat. 9 N. long. 80 W.

The smaller bays, straits, &c. are innumerable.

CHAP.

Subdivisions of the Continent of Europe.

CHAP. VII.

ENGLAND and WALES.

ENGLAND is situated between 49° 57′ and 55° 47′ of north latitude, and between 1° 52′ of east, and 50° 6′ of west longitude (*a*). England, anciently called *Anglia*, or *Albion*, is bounded on the north by that part of Great Britain, called *Scotland*, from which it is separated by the River Tweed, the Cheviot or Teviot Hills, and the River Esk; on the south, by the English Channel, which parts it from France; on the east, by the British Ocean, which divides it from Denmark and the Netherlands; and on the west, England, together with Wales, is bounded by the Irish Sea, which separates them from Ireland.

The Counties of England and Wales, with the Dimensions and Subdivisions of each, also the Number of Members each sends to Parliament.

Counties.	Length	Breadth	Market Towns	Parishes	No. of Members sent to Parliament.
Northumberland	50	40	5	40	8
Cumberland	45	30	12	58	6
Durham	23	23	6	118	4
Westmoreland	30	24	8	26	4

(*a*) Wales is within these limits.

Counties.	Length	Breadth	Market Towns	Pariſhes	No of Members ſent to Parliament.
* Lancaſter	55	31	23	66	14
York	80	80	58	563	30
Cheſter	45	25	11	86	4
Derby	38	28	9	106	4
Nottingham	38	20	8	168	8
Lincoln	55	35	24	630	12
Salop	34	25	13	170	12
Stafford	40	26	16	130	10
Leiceſter	33	24	12	193	4
Rutland	40 in	circum.	2	48	2
Norfolk	30	30	27	660	12
Worceſter	30	22	11	63	9
Warwick	33	25	9	158	6
Northampton	40	20	11	326	9
Bedford	24	13	10	116	4
Huntingdon	20	16	6	79	4
Cambridge	35	20	9	183	6
Suffolk	45	20	25	572	16
Hereford	30	20	8	176	8
Monmouth	24	18	7	127	3
Glouceſter	48	38	20	280	8
Oxford	40	26	12	280	9
Bucks	40	18	15	185	14
Hertford	40	18	16	120	6
Eſſex	40	35	22	415	8
Somerſet	55	42	25	385	18
Wilts	39	29	20	304	34
Berks	40	24	12	140	9
Surry	34	21	7	150	14
Middleſex	19	16	7	74	8
Cornwall	60	40	18	161	44
Devon	50	50	20	394	26
Dorſet	45	25	15	248	20
Hants †	50	30	12	53	26
Suſſex	65	29	13	312	20
Kent ‡	64	40	27	408	10

* The Iſle of Man, which lies weſt of the counties of Weſtmoreland and Lancaſter, is about 30 miles long, and nine broad; it contains four market towns and ſeventeen pariſhes.

† The Iſle of Wight is included.

‡ The Iſles of Shepey and Thanet are included.

WALES.

WALES, (the ancient Cimbria.)

Counties.	Length	Breadth	Market Towns	Pariſhes	Nº of Members ſent to Parliament.
Pembroke	26	20	8	145	3
Carmarthen	35	30	8	87	2
Glamorgan	20	4	11	18	2
Brecon	30	28	4	61	2
Radnor	90 in circum.		4	52	2
Cardigan	32	15	4	64	2
Montgomery	30	22	6	47	2
Merioneth	36	28	3	37	1
Caernarvon	40	20	5	68	2
Denbigh	30	18	4	57	2
Flint	24	14	2	21	2
Iſle of Angleſea	20	16	2	74	2

Since the Norman conqueſt England has been divided into ſix circuits, each containing a certain number of counties; two judges are appointed for each circuit, which they viſit in the ſpring and autumn *(a)*, for the adminiſtration of juſtice.

(a) In the aſſizes held in Spring, the Northern Circuit extends only to York and Lancaſter; the aſſizes at Durham, Newcaſtle, Carliſle, and Appleby, being held only in the Autumn, are diſtinguiſhed by the appellation of the *Long Circuit.*

 The

The Circuits, with their reſpective Counties, and Chief Towns, are as follow.

Circuits.	Counties.	Chief Towns.
1. Home Circuit.	Eſſex —	Chelmsford, Colcheſter, Harwich, Malden, Saffron-Walden, Bocking, Braintree, and Stratford.
	Hertford, (or Hertfordſhire)	Hertford, St. Albans, Ware, Hitchin, Baldock, Biſhops-Stortfort, Berkhamſted, Hemſted, & Barnet.
	Kent —	Maidſtone, *Canterbury*, (abp.) Chatham, *Rocheſter*, Greenwich, Woolwich, Dover, Deal, Deptford, Feverſham, Dartford, Romney, Sandwich, Sheerneſs, Tunbridge, Margate, Graveſend, and Milton.
	Surry —	Southwark, Kingſton, Guildford, Croydon, Epſom, Richmond, Wandſworth, Batterſea, Putney, Farnham, Godalmin, Bagſhot, Egham, and Darking.
	Suſſex —	*Chicheſter*, Lewes, Rye, Eaſt-Grinſtead, Haſtings, Horſham, Midhurſt, Shoreham, Arundel, Winchelſea, Battel, Brighthelmſtone, and Petworth.
2. Norfolk Circuit.	Bucks, (or Buckinghamſhire)	Ayleſbury, Buckingham, High-Wickham, Great-Marlow, Stony-Stratford, and Newport-Pagnel.
	Bedford, (or Bedfordſhire)	Bedford, Ampthill, Wooburn, Dunſtable, Luton, and Biggleſwade.
	Huntingdon, (or Huntingdonſhire)	Huntingdon, St. Ives, Kimbolton, Godmancheſter, St. Neot's, Ramſey, and Yaxley.
	Cambridge, or (or Cambridgeſhire)	Cambridge, *Ely*, Newmarket, Royſton, and Wiſbich.
	Suffolk —	Bury, Ipſwich, Sudbury, Leoſtoff, part of Newmarket, Aldborough, Bungay, Southwold, Brandon, Haleſworth, Mildenhall, Beckles, Franglingham, Stow-market, Woodbridge, Lavenham, Hadley, Long-Melford, Stratford, and Eaſterbergholt.
	Norfolk —	*Norwich*, Thetford, Lynn, and Yarmouth.

The Cities are put in Italicks.

Circuits.	Counties.	Chief Towns.
3. Oxford Circuit.	Oxon, (or Oxfordshire)	* *Oxford*, Banbury, Chippingnorton, Henley, Burford, Whitney, Dorchester, Woodstock, and Tame.
	Berks, (or Berkshire)	Abingdon, Windsor, Reading, Wallingford, Newbury, Hungerford, Maidenhead, Farrington, Wantage, and Oakingham.
	Gloucester, (or Gloucestershire)	*Gloucester*, Tewksbury, Cirencester, part of *Bristol*, Campden, Stow, Berkley, Dursley, Leechdale, Tetbury, Sudbury, Wotton, and Marshfield.
	Worcester, or Worcestersh.)	*Worcester*, Evesham, Droitwich, Bewdley, Stourbridge, Kidderminster, and Pershore.
	Monmouth, (or Monmouthshire)	Monmouth, Chepstow, Abergavenny, Caerleon, and Newport.
	Hereford, (or Herefordsh.)	*Hereford*, Lemster, Weobley, Ledbury, Kyneton, and Ross.
	Salop, (or Shropshire)	Shrewsbury, Ludlow, Bridgnorth, Wenlock, Bishop's-castle, Witchurch, Oswestry, Wem, and Newport.
	Stafford, (or Staffordshire)	Stafford, *Lichfield*, Newcastle under Line, Woolverhampton, Rugely, Burton, Utoxeter, and Stone.
4. Midland Circuit.	Warwick, (or Warwickshire)	Warwick, *Coventry*, Birmingham, Stratford upon Avon, Tamworth, Aulcester, Nuneaton, & Atherton.
	Leicester, (or Leicestershire)	Leicester, Melton-Mowbray, Ashby de la Zouch, Bosworth, and Harborough.
	Derby, (or Derbyshire)	Derby, Chesterfield, Wirksworth, Ashbourne, Bakewell, Balsover, and Buxton.
	Nottingham, (or Nottinghamshire)	Nottingham, Southwell, Newark, East and West Redford, Mansfield, Tuxford, Worksop, and Blithe.

* The City of Oxford and Town of Cambridge are the English Universities, each of them contain a certain number of Colleges and Halls.

Circuits.	Counties.	Chief Towns.
4. Midland Circuit continued.	Lincoln, (or Lincolnshire)	*Lincoln*, Stamford, Boston, Grantham, Croyland, Spalding, New Sleaford, Great Grimsby, Gainsborough, Louth, and Horncastle.
	Rutland, (or Rutlandsh.)	Oakham and Uppingham.
	Northampton, (or Northamptonsh.)	Northampton, *Peterborough*, Daventry, Higham-Ferrers, Brackley, Oundle, Wellingborough, Thorpston, Towcester, Rockingham, Kettering, and Rothwell.
5. Western Circuit.	Hants, (or Hampshire)	*Winchester*, Southampton, Portsmouth, Andover, Basingstoke, Christchurch, Petersfield, Lymington, Ringwood, Rumsey, Arlesford; and Newport, Yarmouth, and Cowes, in the Isle of Wight.
	Wilts, (or Wiltshire)	*Salisbury*, Devizes, Marlborough, Malmsbury, Wilton, Chippenham, Calne, Cricklade, Trowbridge, Bradford, and Warminster.
	Dorset, (or Dorsetshire)	Dorchester, Lyme, Sherborn, Shaftsbury, Pool, Blandford, Bridport, Weymouth, Melcombe, Wareham, and Winburn.
	Somerset, (or Somersetshire)	*Bath*, *Wells*, *Bristol* in part, Taunton, Bridgwater, Ilchester, Minehead, Milbourn-Port, Glastenbury, Willington, Dulverton, Dunster, Watchet, Yeovil, Somerton, Axbridge, Chard, Bruton, Shepton-Mallet, Croscomb, and Froome.
	Devon, (or Devonshire)	*Exeter*, Plymouth, Barnstaple, Bideford, Tiverton, Dartmouth, Tavistock, Topsham, Okehampton, Ashburton, Credeton, Moulton, Torrington, Totness, Axminster, Plympton, Honiton, and Ilfracomb.
	Cornwall,	Launceston, Falmouth, Truro, Saltash, Bodmyn, St. Ives, Padstow, Tregony, Fowey, Penryn, Callington, Leskeard, Lestwithiel, Helston, Penzance, and Redruth.

Circuits.	Counties.	Chief Towns.
6. Northern Circuit.	York, (or Yorkſhire)	*York*, (abp.) Leeds, Wakefield, Halifax, Rippon, Pontefract, Hull, Richmond, Scarborough, Boroughbridge, Malton, Sheffield, Doncaſter, Whitby, Beverly, Northallerton, Burlington, Knareſborough, Barneſley, Sherborn, Bradford, Tadcaſter, Skipton, Wetherby, Ripley, Heydon, Howden, Thirſke, Giſborough, Pickering, and Yarum.
	Durham —	*Durham*, Stockton, Sunderland, Stanhope, Barnard-Caſtle, Darlington, Hartlepool, and Aukland.
	Northumb.	Newcaſtle, Tinmouth, North Shields, Morpeth, Alnwick, and Hexham.
	Lancaſter, (or Lancaſhire)	Lancaſter, Mancheſter, Preſton, Liverpool, Wiggan, Warrington, Rochdale, Bury, Ormſkirk, Hawkſhead, and Newton.
	Weſtmoreland	Appleby, Kendal, Longſdale, Kirkby-Stephen, Orton, Ambleſide, Burton, and Milthorpe.
	Cumberland	*Carliſle*, Penrith, Cockermouth, Whitehaven, Ravenglaſs, Egremont, Keſwick, Workington, and Jerby.

Middleſex and Cheſhire are not comprehended in the above circuits; the former being the ſeat of the ſupreme courts of juſtice, and the latter a county palatine. Beſides the county palatine of Cheſter, there are two others, Lancaſter and Durham; but the two latter are now included in the circuits. There is ſtill a court of Chancery in Lancaſter and Durham, with a chancellor; and there is a court of exchequer at Cheſter, of a mixed kind, both for law and equity, of which the chamberlain of Cheſter is judge: there are alſo other juſtices in the counties palatine to determine civil actions and pleas of the crown.

Counties exclusive of the Circuits	Middleſex	*London*, firſt meridian, N. Lat. 51 32. Weſtminſter, Uxbridge, Brentford, Chelſea, Highgate, Hampſtead, Kenſington, Hackney, and Hampton-Court.
	Cheſhire —	*Cheſter*, Nantwich, Macclesfield, Malpas, Northwich, Middlewich, Sanbach, Congleton, Knotsford, Frodiſham, and Haulton.

CIRCUITS

CIRCUITS OF WALES (*a*).

North-East Circuit.	Flintshire*	Flint, *St. Asaph*, and Holywell.
	Denbighshire	Denbigh, Wrexham, and Ruthen.
	Montgomeryshire	Montgomery, Llanvylin, and Welchpool.
North-West Circuit.	Anglesea, Isle	Beaumaris, Holyhead, and Newburgh.
	Caernarvonshire	*Bangor*, Conway, Caernarvon, and Pullilly.
	Merionethshire	Dolgelly, Bala, and Harlegh.
South-East Circuit.	Radnorshire	Radnor, Prestean, and Knighton.
	Brecon †	Brecknock, Built, and Hay.
	Glamorganshire	*Llandaff*, Cardiff, Cowbridge, Neath, & Swansey.
South-West Circuit.	Pembrokeshire	*St. David's*, Haverfordwest, Pembroke, Tenby, Fiscard, and Milford-haven.
	Cardiganshire	Cardigan, Aberistwith, and Llanbadarn-vawr.
	Caermarthenshire	Caermarthen, Kidwelly, Lanimdovery, Llandilo-vawr, Langharn, Lanelthy.

In ENGLAND.

40	Counties, which send up to parliament ——	80 knights.
25	Cities (Ely none, London four)	50 citizens.
167	Boroughs, two each —	334 burgesses.
5	Boroughs, (Abingdon, Banbury, Bewdley, Highham-Ferrars, and Monmouth) one each	5 burgesses
2	Universities —— —	4 representatives

(*a*) Wales lies between about 51 and 54 degrees of north latitude, and between $2\frac{1}{2}$ and 5 degrees of west longitude.

* If spoken of as Counties, the termination shire must be left out.

† Called Brecknockshire.

The six first mentioned Counties of Wales, are termed North Wales, and the other six South Wales.

8. Cinque

8	Cinque ports, (Hastings, Dover, Sandwich, Romney, Hythe, and their three dependents, Rye, Winchelsea, and Seaford) two each —	16 barons.

WALES.

12	Counties — — —	12 knights.
12	Boroughs (Pembroke two, Merioneth none) one each —	12 burgesses.

SCOTLAND.

33	Shires — —	30 knights.
67	Cities and Boroughs —	15 burgesses.
	Total	558

Besides the 52 counties into which England and Wales are divided, there are counties corporate, consisting of certain districts, to which the liberties and jurisdictions peculiar to a county have been granted by royal charter. Thus the city of London is a county distinct from Middlesex; the cities of York, Chester, Bristol, Exeter, Norwich, Worcester, and the towns of Kingston upon Hull, and Newcastle upon Tyne, are counties of themselves, distinct from those in which they lie. The same may be said of Berwick upon Tweed, which lies in Scotland, and has within its juridiction a small territory of two miles on the north side of the river.

Under

Under the name of a town, boroughs and cities are contained: for every borough or city is a town, though every town is not a borough or city. A borough is ſo called, becauſe it ſendeth up burgeſſes to parliament; and this maketh the difference between a village or town, and a borough. Some boroughs are corporate, and ſome not corporate; and though decayed, as Old Sarum, they ſtill ſend burgeſſes to Parliament. A city is a corporate borough, that hath had, or at preſent hath, a biſhop; for if the biſhopric is diſſolved, yet the city remaineth. To have ſuburbs proveth it to be a city. Some cities are alſo counties, as before mentioned.

Mountains. The moſt noted mountains of England and Wales are the Peak in Derbyſhire, the Endle in Lancaſhire, the Woldes in Yorkſhire, the Cheviot hills on the borders of Scotland, the Chiltern in Buckinghamſhire, the Malvern in Worceſterſhire, Cotſwold in Glouceſterſhire, the Wrekin in Shropſhire, and thoſe of Plinlimmon and Snowdon in Wales.

Foreſts. The principal Engliſh foreſts are Windſor Foreſt, New Foreſt, Foreſt of Dean, Sherwood Foreſt, and Epping Foreſt.

The

Rivers. The principal river of England is the Thames, which riſes on the confines of Glouceſterſhire *, whence it flows on to Oxford, receiving many rivulets in its paſſage; from Oxford it proceeds towards Abingdon, Wallingford, Reading, Marlow, and Windſor; thence through Kingſton to Richmond, where it meets the tide; whence it flows to London, and after dividing the counties of Kent and Eſſex, it widens in its progreſs, till it falls into the ſea at the Nore. The other principal rivers of England, are, the Medway, which riſes near Tunbridge, and falls into the mouth of the Thames at Sheerneſs, whence it is navigable to the largeſt ſhips as far as Chatham. The Severn, reckoned the ſecond river for importance in England, and the firſt for rapidity, riſes at Plinlimmon-hill, in North Wales; it becomes navigable at Welchpool, runs eaſt to Shrewſbury, then turning ſouth, viſits Bridgnorth, Worceſter, and Tewkſbury, where it receives the upper Avon. After having paſſed Glouceſter, it takes a ſouth-weſt direction; near its mouth it is increaſed by the Wye and Uſke, and diſcharges itſelf into the Briſtol Channel, near Ringwood, where the

* It is called the Iſis before it is joined by the Thame above Oxford; hence the Latin name *Tamiſis*.

great ſhips which cannot get up to Briſtol lie. The Trent riſes in the Moorlands of Stafford-ſhire, and running ſouth-eaſt by Newcaſtle-under-Line, divides that county into two parts; then turning north-eaſt on the confines of Der-byſhire, viſits Nottingham, running the whole length of that county to Lincolnſhire, and being joined toward the mouth by the Ouſe, and ſeve-ral other rivers, it obtains the name of the Hum-ber, and falls into the ſea ſouth-eaſt of Hull. Another Ouſe riſes in Buckinghamſhire, and falls into the ſea near Lynn, in Norfolk. The Tine runs from weſt to eaſt through Northumberland, and falls into the ſea at Tinmouth, below Newcaſtle. The Tees runs from weſt to eaſt, it divides Durham from Yorkſhire, and falls into the ſea below Stock-ton. The Tweed runs from weſt to eaſt on the borders of Scotland, and falls into the ſea at Berwick. The Eden runs from ſouth to north through Weſtmoreland and Cumber-land, and falls into Solway Firth, below Car-liſle. The lower Avon runs weſt through Wiltſhire to Bath, and then dividing Somer-ſetſhire from Glouceſterſhire, it runs to Briſtol, and falls into the mouth of the Severn below that city. The Derwent runs from eaſt to

weſt

weſt through Cumberland, and falls into the Iriſh Sea a little below Cockermouth. The Ribble runs from eaſt to weſt through Lancaſhire, it paſſes by Preſton, and diſcharges itſelf into the Iriſh Sea. The Merſey runs from ſouth-eaſt to north-weſt through Cheſhire; it divides Cheſhire from Lancaſhire, and falls into the Iriſh Sea a little below Liverpool. The Dee riſes in Wales, and divides Flintſhire from Cheſhire, and falls into the Iriſh Channel below Cheſter.

Commerce. England has woollen manufactures for one principal part of its foundation. In England, it is ſuppoſed, on an average, there are twelve millions of fleeces ſhorn annually, which are worth nearly one million pounds ſterling. Tin and lead is another great article of commerce; the mines in Cornwall are ſuppoſed to employ 100,000 men. An ore, called mundic, is found in the beds of tin, which furniſhes copper equal in goodneſs to the beſt from Spain: this is ſuppoſed to bring in annually one hundred and fifty thouſand pounds. This ore yields a great quantity of lapis calaminaris, which, mixed with copper, makes braſs. Coals, another article of commerce abound in many counties in England, eſpecially in Northum-

Northumberland and Durham. Many valuable productions, though inferior to the before-mentioned articles, are natives of England, ſuch as corn *, ſaffron, allum, &c. &c. The quality of the Engliſh manufactures, as well upon home produce as foreign, is ſo excellent, that they are univerſally ſought after.

England exports to the *Weſt Indies*, Oſnaburghs, (a coarſe kind of linen with which the Weſt Indians clothe their ſlaves). Linen of all ſorts, broad cloths, kerſeys, ſilks, ſtuffs, ſtockings, ſhoes, hats, millinery-ware, beer, candles, cheeſe, butter; manufactured iron and ſteel, copper, braſs, lead, coals, &c. And in return England imports from the Weſt Indies, ſugar, rum, cotton, logwood, cocoa, coffee, pimento, ginger, indigo, mahogany, manchineel planks, drugs, and preſerves.

England exports to the *Eaſt Indies* all kinds of woollen manufactures, and all ſorts of hardware, lead, and quickſilver; and imports gold, diamonds, raw ſilk, drugs, tea, pepper, arrack, china-ware, and ſaltpetre; England likewiſe imports from thence, for the purpoſe of ſending

* Corn and cattle are conſiderable articles of exportation.

out

out again to foreign countries certain woven manufactures of India, ſuch as wrought ſilks, muſlins, callicoes, and cottons, the uſes of which are prohibited in England, that our own manufacture on the like raw materials may not be diſcouraged.

England exports to *Turkey* woollen cloths, tin, lead, iron, hardware, clocks, watches, verdigris, cochineal, &c. and imports thence raw ſilks, carpets, ſkins, cotton, coffee, dying drugs, &c.

England exports to *Italy* woollen goods of various kinds, peltry, leather, lead, tin, fiſh, and Eaſt India goods, and imports thence raw and thrown ſilk, velvets, wines, oil, ſoap, olives, oranges, lemons, dried fruits, anchovies, &c.

England exports to *Spain* and *Portugal* all kinds of woollen goods, linen, leather, tin, lead, fiſh, corn, iron and braſs manufactures, haberdaſhery wares, &c. and imports thence wines, oil, dried fruits, oranges, lemons, olives, wool, indigo, cochineal and other dying drugs, colours, and gold and ſilver coin.

England exports to *France* tobacco, lead, tin, flannels, horns, cattle, corn, hardware, broad cloths, boots, ſhoes, butter, coals, &c. and imports thence brandies, wines, cambricks, lace, velvets, &c.

England exports to *Flanders* ſerges, flannels, tin, lead, ſugars, and tobacco, and imports thence laces, linen, cambricks, &c.

England exports to *Germany* cloths, ſtuffs, tin, pewter, ſugars, tobacco, and Eaſt India merchandize, and imports thence linen, thread, goats ſkins, tinned plates, timber, &c.

England exports to *Poland* and *Lithuania*, by way of *Dantzic*, refined ſugars, tobacco, woollen goods, hardware, malt liquors, rice, coffee, leather, lead, tin, ſalt, ſea coal, pepper, &c.; our imports thence are but few in compariſon to the exports; they are for the moſt part peltry.

England exports to *Holland* woollen goods, hides, corn, coals, Eaſt India, and Turkey merchandize, tobacco, tar, ſugar, &c. and imports thence fine linen, lace, cambricks, thread, tapes, incle, madder, boards, drugs, whalebone, train-oil, &c.

England

England exports to *Arabia*, *Persia*, *China*, and other parts of *Asia*, bullion, foreign silver coin, woollen manufactures, lead, iron, and brass, and imports thence muslins, cottons, callicoes, raw silks, teas, porcelain, gold dust, coffee, saltpetre, &c.

England exports to *North America* all kinds of English manufactures, and imports thence tobacco, tar, pitch, &c.

England exports to the northern parts of *Europe* and *America* woollen manufactures, hardware, &c. &c. and imports thence peltry, timber, &c.—From *Russia* England receives a great quantity of coarse linen.

Woollen manufactures are common to many towns of England, especially to Norwich, Exeter, and Colchester. In Dorsetshire cordage is manufactured for the navy. Bristol is famous for many manufactures, and particularly glass and brass wire; Birmingham for hardware manufactures, snuff and tobacco-boxes, buttons, shoe-buckles, &c. Sheffield is likewise famous for hardware of all sorts. Worcester and Staffordshire are famous for earthenware; Nottingham, Derbyshire, Leicester, Co-

ventry, &c. are each noted for ſome particular commodity; Mancheſter is noted for its beautiful cottons, dimities, tickens, checks, and velvets, as are likewiſe different towns in Yorkſhire.

The Engliſh carpets, particularly thoſe of Wilton and Kidderminſter, exceed thoſe of Turkey in beauty.

CHAP.

CHAP. VIII.

Of SCOTLAND, (the ancient Caledonia.)

THAT part of Great Britain, called Scotland, is bounded on the south by England and the Irish Sea, on every other extremity it is bounded by the Ocean. Scotland is separated from England by a line from Solway Firth, passing eastward along the Cheviot Hills, and thence a very little to the northward of the River Tweed *. It is situated between 54 and and 59° of north latitude, and between 1 and 6° of west longitude.

Scotland has been distinguished by some authors into Highlands and Lowlands; the thirteen most northerly counties were deemed the Highlands, and all the rest Lowlands. It is now mostly considered as being divided into

* The Town of Berwick on the north side of the Tweed, commonly called Berwick upon Tweed, is formed into a town and county of itself, having particular privileges of its own, which distinguishes it in a political sense from England and Scotland.

north and ſouth from the Frith of Forth towards the weſt, having fifteen counties north, and eighteen ſouth: it is ſubdivided into ſheriffdoms, ſtewarties, and bailiwicks, according to the ancient tenures and privileges of the landholders. The ſhires, &c. are as follow:

Shires.	Sheriffdoms & other ſubdiviſions.	Chief Towns.
Wigtown	Galloway, Weſt Part —	Wigtown, Stanraer, and Whitehorn.
Kirkcudbrigh	Galloway, Eaſt Part	Kirkcudbright.
Dumfries	Nithſdale, Annandale —	Dumfries, Annand.
Roxborough	Tiviotdale, Lidſdale, Eſkdale and Euſdale —	Jedburgh, Kelſo, and Melroſs.
Air	Kyle, Carrick, and Cunningham	Air, Kilmarnock, Irwin, Maybole, Stewarton, and Saltcots.
Lanerk	Clydeſdale —	Glaſgow, Hamilton, Lanerk, and Rutherglen.
Peebles	Tweedale —	Peebles.
Selkirk	Ettrick Foreſt —	Selkirk.
Bute *	Bute, Arran, —	Rothſay.
Renfrew	Renfrew —	Renfrew, Paiſley, Greenock, and Port-Glaſgow.
Linlithgow	Weſt-Lothian —	Linlithgow, Burroughſtonneſs, & Queensferry.
Edinburgh	Mid-Lothian —	Edinburgh, Muſſelburgh, Leith, and Dalkeith.

* Buteſhire contains the Iſlands of Bute and Arran, both in the Frith of Clyde. Bute is about ten miles long, and three or four broad; in it is the Caſtle and Royal Burgh of Rothſay, which gave the title of Duke to the eldeſt ſons of the Kings of Scotland, as it now does to the Prince of Wales.

Shires.

Shires.	Sheriffdoms & other subdivisions.	Chief Towns.
Merse, antiently Berwick	The Merches, and Lauderdale	Duns, and Lauder.
Haddington	East-Lothian —	Dunbar, Haddington, and North-Berwick
Dumbarton	Lenox — —	Dumbarton.
Stirling	Stirling	Stirling & Falkirk.
Kinross and Clacmanan	Fife Part —	Alloway, Kinross, Culros, and Clacmanan.
Fife —	Fife ——	St. Andrew's, Cowper, Falkland, Kirkaldy, Innarkythen, Ely, Burnt Island, Dumfermlin, Dysart, Anstruther, and Aberdour.
Argyle —	Argyle, Cowal, Knapdale, Cantyre, and Lorn, with part of the Western Isles, particularly Isla, Jura, Mull, Wist, Terif, Col, and Lismore —	Inverary, Dunstaffnage, Killonmer, and Campbeltown.
Perth —	Perth, Athol, Gowry, Broadalbin, Monteith, Strathern, Glenshield and Raynork —	Perth, Scone, Dumblane, Blair, and Dunkeld.
Forfar —	Forfar, Angus	Montrose, Forfar, Dundee, Abroath, and Brechin.
Kincardin	Merns —	Bervie, Stonhive, and Kinkardin.

Inverness

Shires.	Sheriffdoms & other subdivisions.	Chief Towns.
Invernefs	Aird, Strathglafs, Sky, Harris, Badenoch, Lochaber, and Glenmorifon —	Invernefs, Inverlochy, Fort Auguftus, Beaulieu.
Nairne & Cromartie	Weftern part of Murray and Cromartie.	Nairne, Cromartie.
Elgin	Murray and Strathfpey —	Elgin and Forres.
Bamff —	Bamff, Strathdovern, Boyne, Euzy, Balveny, Strathawin, and part of Buchan	Bamff and Cullen.
Aberdeen	Mar, Buchan, Garioch, and Strathbogie —	Old Aberdeen, New Aberdeen, Frafersburgh, Peterhead, Kintore, Inverarie, Strathbogie, and Old Meldrum.
Rofs —	Eafter and Wefter Rofs, Ifle of Lewis, Lochbroom, Lochcarran, Ardmeanach, Redcaftle, Ferrintofh, Strathpeffer, and Ferrindonald	Taine, Dingwall, Fortrofe, Rofemarkie, and New Kelfo.
Sutherland	Strathnaver and Sutherland	Strathy & Dornoch.
Cathnefs	Cathnefs —	Wick and Thurfo,
Orkney —	Ifles of Orkney and Shetland —	Kirkwall and Skalloway.

In all thirty-three fhires, which chufe thirty reprefentatives to fit in the parliament of Great Britain, Bute and Cathnefs chufing alternately, as do Nairne and Cromartie, and Clacmanan and Kinrofs.

The

The Royal Burghs which chuse Representatives are,

Edinburgh —	1	Dyser, Kirkaldy, Kinghorn, & Burnt Island	1
Kirkwall, Wick, Dornoch, Dingwall, and Tayne —	1	Glasgow, Renfrew, Rutherglen, and Dumbarton —	1
Fortrose, Inverness, Nairne, and Forres	1	Haddington, Dunbar, North Berwick, Lauder, and Jedburgh	1
Elgin, Cullen, Bamff, Inverury, and Kintore	1	Selkirk, Peebles, Linlithgow, and Lanerk	1
Aberdeen, Bervie, Montrose, Aberbrothe, and Brechin	1	Dumfries, Sanquehar, Annan, Lochmaben, and Kircudbright	1
Forfar, Perth, Dundee, Cowper, and St. Andrews —	1	Wigtown, New Galloway, Stranrawer, and Whitehorn —	1
Crail, Kilrenny, Anstruther East & West, and Pittenweem	1	Air, Irwin, Rothsay, Campbelton, and Inverary —	1
Innerkythen, Dumfermline, Queensferry, Culross, and Stirling —	1		

There are four Universities in Scotland, viz. St. Andrews, Glasgow, Aberdeen, and Edinburgh.

Rivers of Scotland. The Forth is the largest river in Scotland; it rises near Monteith, passes by Stirling, and discharges itself into the British Ocean near Edinburgh; its mouth is known by the name of the Firth of Forth. The next principal river in Scotland is the Tay, which issues from Loch Tay, passes the town of Perth, and falls into the sea at Dundee: this

this river is the ſeparation between the Highlands and Lowlands. The Spey is the moſt rapid river in Scotland, it riſes in Bandenoch, and falls into the ſea near Elgin, as do likewiſe the rivers Dee and Don. The Tweed riſes on the borders of Lanerkſhire, and diſcharges itſelf into the ſea at Berwick. The Clyde riſes in Annandale, paſſes by Lanerk, Hamilton, Glaſgow, Renfrew, Dumbarton, and Greenock, and falls into the Firth of Clyde, oppoſite to the Iſle of Bute. A communication has been made between the rivers Forth and Clyde by means of a canal, but towards the Clyde it is not ſufficiently deepened to admit ſhips of even ſmall burthen; by a collateral cut made navigable to veſſels of ſmall burthen from the canal to Glaſgow, the merchants there are much benefited. Another cut of about a mile has been made from Loch Fyn *, through the Iſthmus of Cantire, in Argyleſhire.

The coaſts of Scotland are in many parts indented, with navigable bays, called Firths or Lochs. The Lakes are likewiſe called

* Loch Fyn is remarkable for its fine herrings.

Lochs,

Lochs, as Loch Lomond, in Dumbartonſhire; Loch Tay, in Perthſhire, Loch Neſs, in Inverneſsſhire, &c.

At Campbletown, in Argyleſhire, there is ſometimes an aſſemblage of two or three hundred fiſhing veſſels, called Buſſes. The Scotch alſo engage in the Whale fiſheries. They have ſeveral woollen manufactories.

Scotland produces great quantities of iron, which is worked in its own founderies.

CHAP.

CHAP. IX.

Of IRELAND, (the ancient Britannia Parva, called alſo Hibernia.)

IRELAND is ſituated weſt of Great Britain, between 51° and 55° 20′ of north latitude, and between 6° and 10° 35′ of weſt longitude; it is encompaſſed by the Iriſh Sea and the Atlantick. Ireland is generally conſidered as being divided into four provinces, each of which contains a certain number of counties; they are as follow:

Provinces.	Counties.	Chief Towns.
Ulſter, nine Counties.	Down, —	Down Patrick.
	Armagh, —	Armagh.
	Monaghan, —	Monaghan.
	Cavan, —	Cavan.
	Antrim, —	Carrickfergus.
	Londonderry,	Derry.
	Tyrone, —	Omagh.
	Fermanagh,	Enniſkillen.
	Donegall, —	Lifford.
Connaught, 5 Counties.	Leitrim, —	Carrick on Shannon.
	Roſcommon,	Roſcommon.
	Mayo, —	Ballinrobe & Caſtlebar.
	Sligo, —	Sligo.
	Galway, —	Galway.

Leinſter,

Provinces.	Counties.	Chief Towns.
Leinster, 12 Counties.	Dublin, —	*Dublin.*
	Louth, —	Drogheda.
	Wicklow, —	Wicklow.
	Wexford, —	Wexford.
	Longford, —	Longford.
	East Meath, —	Trim.
	West Meath, —	Mullingar.
	King's County,	Philipstown.
	Queen's County,	Maryborough.
	Kilkenny, —	Kilkenny.
	Kildare, —	Naas and Athy.
	Carlow, —	Carlow.
Munster, six Counties.	Clare, —	Ennis.
	Cork, —	Cork.
	Kerry, —	Tralee.
	Limerick, —	Limerick.
	Tipperary, —	Clonmell.
	Waterford, —	Waterford.

Rivers. The Shannon issues from Lough Allen, in the county of Leitrim; it divides Connaught from the other three provinces, and falls into the Atlantick about long. 10° west, between Loop Head and Kerry-point.

The Boyne falls into St. George's Channel at Drogheda. The Liffey runs through the city of Dublin, and falls into the Bay. The Barrow, Nore, and Suir unite their streams, and fall into Waterford Haven.

The coasts of Ireland are indented with many fine bays, havens, harbours, and creeks. Several

veral canals have been cut in different parts of the kingdom; that between the Liffey at Dublin and the Shannon, is about 60 miles in extent, and opens a communication between St. George's Channel and the Atlantick.

Ireland has four Archbiſhopricks, viz. Armagh, Dublin, Caſhel, and Tuam. The Biſhopricks are eighteen in number, viz. Clogher, Clonfert, Cloyne, Cork, Derry, Down, Dromore, Elphin, Kildare, Killaloe, Leighlin, Limerick, Killala, Meath, Oſſory, Raphoe, Kilmore, and Waterford.

Ireland has one Univerſity, called Trinity College, which is in Dublin. The number of ſtudents belonging to it are about 400. It has the power of conferring the degrees of Bachelor, Maſter, and Doctor in all the arts and faculties.

The chief commercial commodities of Ireland are, linen, ſtuffs, beef, pork, hides, tallow, butter, cheeſe, honey, wax, ſalt, hemp, pipe-ſtaves, &c.

CHAP.

CHAP. X.

Of DENMARK and NORWAY.

Denmark *and* Norway *are parts of the ancient Scandinavia.*

DENMARK, on the Continent, (anciently called Cimbrica Cherſoneſus), contains *North Jutland* and *South Jutland*, or the *Duchy* of *Sleſwick*. Jutland was formerly called Cimbria; it lies between 54 and 58 degrees of north latitude, and between 8 and 11 degrees of eaſt longitude. It is bounded on the north by that part of the Britiſh Ocean which leads towards the Cattegate; on the ſouth by Germany; on the eaſt by the Cattegate and the Sound, which ſeparates it from Sweden; and on the weſt by the Britiſh Ocean. The ſeveral iſlands at the entrance of the Baltic, mentioned with the principal European iſlands, likewiſe Iceland, in the Northern Ocean, and the Faro Iſlands, all belong to Denmark. The two principal iſlands at the entrance of the Bal-

tic, are *Zealand* and *Funen*. Copenhagen, the capital of Denmark, is in the island of Zealand. Funen is west of Zealand; the passage between them is called the Great Belt. The Little Belt is between Funen and Jutland. *Oldenburgh* and *Delmenhorst*, in Westphalia, one of the grand divisions of Germany, and *Stromar*, in Lower Saxony, another grand division, are both subject to Denmark, as is likewise the northern part of *Holstein*, in the same division.

Norway, (anciently Norwegia), which is also subject to Denmark, lies between 58 and 72 degrees of north latitude, and between about 4° and 30° of east longitude; it is bounded on the north and the west by the Northern Ocean; on the south, by the part of the British Ocean which leads to the Cattegate; and on the east, by a ridge of mountains, extending from the most northern to the most southern parts, dividing it from Sweden. It is principally divided into the governments of *Bergen*, *Aggerhuys*, *Drontheim*, and *Wardhuys*, which contains *Norwegian* or *Danish Lapland*.

CHAP.

CHAP. XI.

Of SWEDEN *, (a part of the ancient Scandinavia, called Suecia.)

SWEDEN lies between 56 and 69 degrees of north latitude; and between 10 and 31 degrees of east longitude. It is bounded on the north by Norwegian or Danish Lapland; on the south, by the Cattegate Sea, the Baltic Sea, and the Gulf of Finland; on the east, by Russia and the Baltic, and on the west, by the Norwegian mountains and the Cattegate.

Sweden is principally divided into *Sweden proper*, (which contains *Stockholm*), *Gothland*, *Schonen*, *Swedish Lapland*, and *West Bothnia*; *Swedish Finland* and *East Bothnia*, and the islands of *Gothland*, *Oeland*, and *Rugen*, mentioned with the principal European islands. The *Principality of Pomerania*, in Upper Saxony, (one of the grand divisions of Germany), likewise belongs to Sweden.

* Norway, Denmark, and Sweden made the whole of the ancient Scandinavia.

CHAP. XII.

Of RUSSIA (anciently Muſcovia, containing a great part of ancient Sarmatia Europea and Sarmatia Aſiatica).

RUSSIA, in Europe and Aſia, lies between 47 and 72 degrees of north latitude, and between 23 and 180 degrees of eaſt longitude. It is bounded on the north by the Northern Ocean; on the ſouth, by Poland, Little Tartary, part of the Turkiſh dominions, and Independent Mogulean and Chineſe Tartary; on the eaſt by the northern part of the Pacific Ocean; and on the weſt by the White Sea, Sweden, the Baltic Sea, Pruſſia, and Poland.

Ruſſia is divided into 31 governments, among which are, *Ruſſian Finland*, *Ruſſian Lapland*, *Kexholm*, *Ingria*, (which contains *Peterſburgh*), *Livonia*, *Dwina*, *Great Novogorod*, *Little Novogorod*, *Muſcow*, *Belgorod*, *Don Coſſacks*, *Ukraine*, &c. &c. alſo the *Dutchy of Courland* in *Poland*, *Crim Tartary* in *Turkey*, *Siberia*, which extends to the Pacific Ocean, and many Tartarian nations.

CHAP.

CHAP. XIII.

Of POLAND (a part of ancient Sarmatia Europea.)

POLAND, excluding Courland, and including Lithuania, lies between 47° 30', and 56° 30' of north latitude, and between 16 and 32 degrees of east longitude. It is bounded on the north and on the east by Russia; on the south by Hungary and Turkey in Europe; and on the west by Germany.

Poland is principally divided into *Lithuania*, *Podolia*, *Volhinia*, *Red Russia*, *Great Poland*, *Little Poland*, *Polesia*, *Masovia*, in which is the capital, *Warsaw*, *Samogitia*, *Prussia Royal*, and *Polachia*.

CHAP. XIV.

Of PRUSSIA, (formerly a province of Poland, divided into Regal and Ducal Prussia.)

PRUSSIA is bounded on the north by part of Samogitia, on the south by part of Poland

 Proper,

Proper, and Masovia, on the east by part of Lithuania, and on the west by Polish Prussia and the Baltic.

The Prussian dominions are scattered in different parts of Germany, in Poland, on the shores of the Baltic, and in Switzerland. They are as follow:

Ducal Prussia, Brandenburgh in Upper Saxony, one of the grand divisions of Germany, (in which is Berlin, the royal residence); Prussian and Swedish Pomerania, both likewise in Upper Saxony; Magdeburg and Halberstadt, both in Lower Saxony, another grand division of Germany; Glatz in Bohemia, and Minden, Ravensburg, Cleves, Mark, and Embden, all in Westphalia, another grand division of Germany; Meurs in the Lower Rhine, another grand division of Germany; Gelder in the Netherlands, Neufchatel in Switzerland, great part of Silesia, (which is south-east of Brandenburg), the cities of Dantzic and Thorn, and the adjacent country near the rivers Vistula and Neister.

CHAP.

CHAP. XV.

Of GERMANY, (a part of ancient Germany, Gaul, and Illyricum).

GERMANY lies between 45 and 55 degrees of north latitude, and between 5 and 19 degrees of east longitude. It is bounded on the north by the British Ocean, Denmark, and the Baltick; on the south, by Switzerland and the Alps, which divide it from Italy; on the east, by Poland and Hungary, including Bohemia; and on the west, by the Netherlands and France, from which it is separated by the rivers Maes, Moselle, and Rhine.

Germany is principally divided into nine circles, three north, three middle, and three south, they are as follow;

The Northern Circles,	Upper Saxony, Lower Saxony, Westphalia.
The Middle Circles,	Upper Rhine, Lower Rhine, Franconia.

The

The Southern Circles, { Auſtria *, Bavaria, Swabia.

Theſe Circles are each divided into many parts, under the names of Principalities, Duchies, Landgravates, Marquiſates, Counties, Archbiſhopricks, Biſhopricks, &c. †, making in all about 300 diviſions. In almoſt all of theſe diviſions, the perſon at the head of each, is an arbitrary prince or governor within his own territories, but with reſpect to the concerns of the empire at large, they all, together with the imperial towns, and the Emperor as head of the whole, form one collective political body, called the Diet, the determinations of which are binding to every diviſion.

The Empire, though elective, has, through policy, been veſted almoſt uninterruptedly in the Houſe of Auſtria for ſeveral centuries, the Electors of the Empire are nine, as follow:

The Archbiſhop of Mentz,
The Archbiſhop of Treves,

* The circle of Auſtria contains Vienna.

† Several Abbots and Abbeſſes, choſen by their reſpective Chapters, have abſolute juriſdiction within certain diſtricts.

The

The Archbiſhop of Cologne,
The Elector of Saxony,
The Elector of Brandenburgh,
The Elector of Hanover,
The Elector Palatine,
The Elector of Bavaria,
The Elector of Bohemia.

The chief of the eccleſiaſtical and ſecular princes of the empire, beſides the Electors are, the Archbiſhop of Saltzburg, the Biſhops of Liege, Munſter, Spire, Worms, Wirtſburgh, Straſburgh, Oſnaburgh, Bamburgh; the Landgrave of Heſſe; the Dukes of Brunſwick, Wolfenbuttel, Wirtemberg, Mecklenburgh, Saxe Gotha; the Marquiſſes of Baden and Culmbach, and the Princes of Naſſau, Anhalt, Furſtenburgh, &c. The imperial and free cities are likewiſe ſovereign ſtates, and have peculiar privileges, among which the Hanſe * Towns enjoy the greateſt.

Germany has 36 Univerſities, of which 17 are proteſtant.

* The Hanſe Towns were formerly in league together for the defence of the whole, and in lieu of their former conſequence, by the preſent ſyſtem of politics, they enjoy great privileges and immunities.

CHAP. XVI.

Of BOHEMIA, with Silesia and Moravia.

BOHEMIA lies between 48 and 52 degrees of north latitude, and between 12 and 19 degrees of east longitude. It is bounded on the north by Upper Saxony; on the south, by Bavaria and Austria; on the east, by Poland and Hungary; and on the west, by Franconia and Bavaria.

Bohemia Proper, which contains Prague, the capital, is mostly subject to the House of Austria; Silesia is mostly subject to the King of Prussia; and Moravia is entirely subject to the House of Austria.

The Emperor of Germany is King of Bohemia; Bohemia, however, though an electorate of Germany, is not a part of it, for it is not subject to its laws, neither does it contribute towards its forces or revenues, for the forms of the old constitution still subsist, though the government under the Emperor is despotic.

CHAP.

CHAP. XVII.

Of HOLLAND, (the ancient Batavia, and part of ancient Belgium.)

HOLLAND, commonly known by the name of the Seven United Provinces, lies between about 51 and 54 degrees of north latitude, and between 3 and 7 degrees of east longitude. It is bounded on the north and west by the British Ocean; on the south, by Flanders; and on the east, by Westphalia.

The provinces of Holland are, Holland, in which is Amsterdam, the capital; Overyssel, Zealand, Friesland, Utrecht, Groningen, Gelderland and Zutphen; the two last form but one sovereignty. The Delegates from these provinces meet at the Hague *, and form what is called the States General.

The Texel, and several small islands to the north, at the entrance into the Zuyder Sea, are subject to the United Provinces.

The Universities of Holland are, Leyden, Utrecht, Groningen, Harderwicke, and Franeker.

* The Hague, which contains the Stadthouse, is only a village. Rotterdam is the next principal town to Amsterdam.

CHAP.

CHAP. XVIII.

Of FLANDERS, including the provinces of Brabant, Antwerp, Malines, Limburg, Luxemberg, Namur, Hainault, Cambresis, and Artois.

THESE ten provinces, commonly ſpoken of under the name of Flanders, lie between 49 and 52 degrees of north latitude, and between 2 and 7 degrees of eaſt longitude: they are bounded on the north by the Seven United Provinces; on the ſouth, by France; on the eaſt, by Germany; and on the weſt, by the Britiſh Sea and the north of France.

The ten provinces, together with the Seven United ones, are called the Netherlands, from their ſituation with reſpect to Germany; they were formerly a part of Gallia Belgica, and afterwards of the circle of Belgium or Burgundy, in the German empire.

The Province of Flanders Proper is divided into Dutch Flanders, Auſtrian Flanders, and French Flanders, from the different governments which they are ſubject to.

Brabant

Brabant is divided into Dutch and Auſtrian Brabant.

Antwerp and Malines are both ſubject to the Houſe of Auſtria.

Limburgh is partly ſubject to Auſtria, and partly to the Dutch; the Town of Limburgh belongs to Auſtria.

Luxemburgh is divided into Auſtrian and French Luxemburgh; the town of Luxemburgh belongs to Auſtria.

Namur is ſubject to Auſtria.

Hainault is divided into Auſtrian and French Hainault.

Cambreſis and Artois are both ſubject to France.

CHAP.

CHAP. XIX.

Of FRANCE, (anciently Gallia and Celtæ.)

FRANCE lies between 42 and 51 degrees of north latitude, and between 5 degrees of weſt, and 8 degrees of eaſt longitude. It is bounded on the north by the Engliſh Channel and the Netherlands; on the ſouth, by the Mediterranean Sea and by Spain, which it is divided from by the Pyrenean Mountains; on the eaſt, by Germany, Switzerland, and Italy; and on the weſt, by the Atlantick Ocean and the Bay of Biſcay.

France is principally divided into the following provinces, viz.

Picardy, containing the territory of Boulonois *; Normandy; Iſle of France, in which is the City of Paris; Lorraine †; Alſace ‡;

* Artois, mentioned as one of the provinces of the Netherlands, is now moſtly conſidered by the French as a part of Picardy.

† Formerly a Dutchy belonging to the circle of the Upper Rhine.

‡ Formerly a province belonging to Germany, ceded to France by the treaty of Munſter.

Bretagne;

Bretagne; Orleanois, (by much the largest province in France,) containing the Dutchy of Anjou, and the territories of Poitou, Aunis, Maine, Perche, Touraine, Berry, and Nivernois; the Dutchy of Burgundy or Bourgogne; Franche Comte; Lyonnois, containing the Dutchy of Bourbonnois, and the territories of La Marche, Auvergne, Forez, and Beaujolois; Guienne, containing the territories of Angoumois, Saintonge, Perigord, Limousin, Agenois, Quercy, Bazadois, and Rouergue; Gascony, or Gascogne, containing the territories of Condomois, Amanac, Estarac, Bigorre, Cominga, and other small territories near the Pyrenees; Languedoc, containing the territories of Gevaudan, Velay, Vivarez, and Foix; Dauphine; Provence; Rousillon; Bearn, and part of Navarre.

The dominions belonging to France in the West Indies, the Mediterranean, &c. have been already mentioned.

The islands near the French coast, (besides Jersey, &c. which belong to Great Britain,) are, Ushant, or d'Ouessant, west of Bretagne; Bellisle, south of Bretagne; Isle d'Ieu, west of Poitou; islands of Re and Oleron, west of Aunis; islands of Levant and Port Cros, south of Provence.

CHAP. XX.

Of SPAIN, (the ancient Iberia or Hesperia.)

SPAIN lies between 36 and 44 degrees of north latitude, and between 10 degrees of west, and 3 degrees of east longitude. It is bounded on the north by the Bay of Biscay and by France, from which it is separated by the Pyrenean Mountains; on the south, by the Atlantic Ocean, the Straits of Gibraltar, and the Mediterranean Sea; on the east, by the Mediterranean; and on the west, by Portugal and the Atlantic Ocean.

Spain is principally divided into the following provinces, viz. New Castile, in which is the City of Madrid; Old Castile, Estremadura, Leon, Galicia, The Asturias, Biscay, and Ipuscoa, Upper Navarre, Arragon, Catalonia, Valencia, Murcia, Grenada, and Andalusia.

The dominions belonging to Spain, in America, the West Indies, and the Mediterranean, have been already mentioned.

CHAP.

CHAP. XXI.

Of PORTUGAL, (a great part of ancient Lusitania, Gallicia, and Bœtica.)

PORTUGAL lies between 37 and 42 degrees of north latitude, and between 7 and 10 degrees of west longitude. It is bounded on the north and east by Spain, and on the south and west by the Atlantick Ocean.

Portugal is principally divided as follows, viz. Estremadura, in which is the City of Lisbon; Beira, Entre Minho, Entre Douro, Tralas Montes, Entre Alentejo, Entre Guadiana, Entre Tago, and Algarva.

The dominions belonging to the Portuguese in South America, &c. have been already mentioned.

CHAP. XXII.

Of SWITZERLAND, (the ancient Helvetia.)

SWITZERLAND lies between 45 and 48 degrees of north latitude, and between 6 and 11 degrees of east longitude. It is bounded on the north by Alſace and by the circle of Swabia; on the ſouth, by Italy; on the eaſt, by the Lake of Conſtance, and the ſouth-eaſt part of the circle of Auſtria; and on the weſt, by France.

Switzerland is principally divided into 13 parts, called Cantons, viz. Berne, in which is the City of Berne; Zurick, Lucerne, Uri, Suiſſe, Underwalden, Zug, Glaris, Baſil, Fribourg, Soleure, Schaffhauſen, and Appenzel.

The Country of the Griſons, which is S. E. of the Cantons, is in alliance with Switzerland, as is likewiſe Valais, which lies between the head of the River Rhone and the Lake of Geneva, the Town or Republic of Geneva, St. Gall, Neufchatel, Tockenburg, Baſil, and Mulhauſen, in Alſace.

CHAP. XXIII.

Of ITALY, (anciently known by the names of Hesperia, Saturnia, Latium, &c.)

ITALY lies between 38 and 47 degrees of north latitude, and between 7 and 19 degrees of east longitude. It is bounded on the north by Switzerland and Germany, from which it is divided by the mountains, called the Alps; on the south, by the Mediterranean Sea; on the east, by the Gulf of Venice; and on the west, by the Mediterranean Sea and by France, from which it is separated by the Alps.

Italy is principally divided as follows, viz. into Piedmont, the Dutchy of Savoy, Montserrat, Alessandrine, Oneglia, and the Island of Sardinia, all which belong to his Sardinian Majesty (who resides at Turin); the Dutchy of Milan, Mantua, and Mirandola, all which belong to the Emperor of Germany; Venice, Istria, Dalmatia, and its islands, all which belong to the Republic of Venice; the Dutchy of Tuscany, Massa, Parma, Modena, Piombino, and Monaco, all which belong to their respective

Princes; the Republics of Lucca, St. Marino, and Genoa; the Iſland of Corſica, which belongs to France; the Pope's dominions, which extend from the S. E. part of Mantua to the N. W. part of Naples, and contain the City of Rome; Naples, and the Iſland of Sicily, which belong to the King of Naples, or of the Sicilies.

CHAP. XXIV.

Of HUNGARY, (a part of ancient Pannonia, Germany, and Dacia.)

HUNGARY lies between 45 and 49 degrees of north latitude, and between 17 and 23 degrees of eaſt longitude. It is bounded on the north by Poland, from which it is ſeparated by the Carpathian mountains; on the ſouth, by Sclavonia*; on the eaſt, by the principality of Tranſylvania †, and by Walachia, a province of Turkey; and on the weſt, by Auſtria, and by Moravia, a province of Bohemia.

* A province ſubject to the Houſe of Auſtria; it is bounded on the N. E. by the rivers Drave and Danube, and is about 200 miles long, and 60 broad.

† Likewiſe ſubject to Auſtria.

Hungary

Hungary is divided into Upper Hungary, which is north of the river Danube, and Lower Hungary, which is south of the same. The towns of Presburgh, Newhausel, Tokay, Great Warradin, Læopolstadt, Agria, Esperies, Chremnits, Shemnits, Pest, and others, are in Upper Hungary; Buda, Komera, Gran, Raab, Weissenberg, Altenburg, Kanisba, and others, are in Lower Hungary.

The Bannat of Temeswaer belongs to Hungary; it is divided into four parts, one of which contains the town of Temeswaer, latitude 45° 50′ north, longitude 22° east.

CHAP. XXV.

Of TURKEY in Europe. *(a)*.

TURKEY in Europe, lies between 36 and 49 degrees of north latitude, and between 17 and 40 degrees of east longitude. It is bounded on the north by Germany, Hungary, Poland, and Russia; on the south, by the Mediterranean and Black Sea; on the east, by Circassia *, the eastern parts of the Black Sea,

(a) Belonging to the Grand Seignior, who has dominions likewise in Asia and Africa.

* East of Crim Tartary.

Sea of Marmora, and the Archipelago; and on the west, by the Gulf of Venice and the Ionian Sea.

Turkey in Europe is principally divided into the following provinces, viz.

Romania, (the ancient Thrace) which contains Constantinople, sometimes called the Porte, anciently called Byzantium; Bosnia, (part of ancient Illyricum; Dalmatia *; Servia, (west part of ancient Mysia;) Bulgaria, (the east part of ancient Mysia;) Albanea; Macedonia; Janua, (anciently Thessaly;) Epirus; Livadia, (anciently Bœotia and Achaia), which contain Athens and Thebes, now called Stives; Corinthia; Olympia †; Argos; Sparta, (containing Misitra, (the ancient Lacedæmon); Arcadia; Elis; the six last mentioned are in the Morea, the ancient Peloponnesus. Walachia, (a part of ancient Dacia); Moldavia (in the ancient Dacia); Bessarabia; Budziac Tartary, and Crim ‡ and Little Tartary, (the ancient Taurica Chersonesus.)

* South of Dalmatia, is Ragusa, a Republic mostly under the protection of the Grand Seignior. Five small islands belong to the Ragusan, the principal of which is Melida.

† Where the Olympic games were held.

‡ Crim Tartary is now ceded to the Russians.

CHAP. XXVI.

Of TURKEY in ASIA.

TURKEY in Aſia lies between 28 and 45 degrees of north latitude, and between 27 and 46 degrees of eaſt longitude. It is bounded on the north by the Black Sea, the Sea of Aſoph, Circaſſian Tartary *, and Aſtracan †; on the ſouth by the Levant Sea, and by Arabia; on the eaſt by the Caſpian Lake, and by Perſia; and on the weſt by the Archipelago, the Helleſpont, and Propontis, the eaſtern parts of which ſeparate it from Europe.

Turkey in Aſia is principally divided into Natolia, (anciently Aſia Minor) which contains the provinces of Amaſia, Aladuli, and Caramania.

* The Circaſſian Tartars form a kind of republic, but at different times have put themſelves under the protection of the Turks, the Perſians, and the Ruſſians.

† A part of the Ruſſian dominions in Aſia.

Georgia *, (the ancient Iberia) including Mengrelia, Imaretta, and part of Circassia.

Turcomania, the ancient Armenia Major †.

Diarbec, (the ancient Mesopotamia, mentioned in ‡ Scripture as Padanaran) part of ancient Assyria.

Curdistan (another part of the ancient Assyria).

Eyrac Arabic ‖ (the ancient Chaldea, or Babylonia, another part of the ancient Assyria).

Syria modern comprehends the ancient Syria, Phenicia, and Palestine, or Judea, called also Canaan.

Arabia §, which is divided into Arabia Deserta,

* The Georgians put themselves under the protection of Turkey in 1780.

† The ancient Armenia Minor is a part of Persia.

‡ The ancient Assyrian empire contained the modern provinces of Eyrac Arabic, Diarbec, and Curdistan.

‖ Situated on the river Euphrates.

§ The northern Arabs are in subjection to the Turks; other parts are governed by different Arabian princes, and some parts are under no particular government.

ſerta, Arabia Petræa, and Arabia Felix, belongs in part to the Turks.

Within the before-mentioned provinces the rivers Euphrates, Jordan *, Tigris, and Orontes, are contained; likewiſe the mountains Sinai, Horeb, Lebanon, Olympus, Hermon, Daghiſtan, Caucaſus, Ararat, and Antitaurus; and the cities of Jeruſalem, Damaſcus †, Samaria, Sure and Sayd (the ancient Tyre and Sidon), Antioch, Epheſus, Nineveh, Aleppo, Heliopolis, or Balbec, Tripoli, Scandaroon, or Alexandretta, Bagdat, Balſora, &c. and the once famous Palmyra, or Tadmor, now in ruins.

* This river, after being increaſed by the lake of Geneſareth, or Tiberius, (which is twelve miles long and eight broad) falls into the Dead Sea, or rather lake, which is a little ſouth of Jeruſalem. This lake is ſuppoſed to occupy the place of Sodom and Gomorrah. No fiſh can live in it, on account of its noiſome ſmell and bitter taſte.

† The Turks have given different names to moſt of theſe places—Damaſcus they call Scham.

CHAP. XXVII.

Of PERSIA.

PERSIA lies between 25 and 44 degrees of north latitude, and between 44 and 70 degrees of east longitude. It is bounded on the north by Circassian Tartary, the Caspian Lake, and the river Oxus; on the south by the Gulfs of Persia and Ormus, and by the Indian Ocean; on the east by India; and on the west by the empire of Turkey.

Persia is principally divided into the following provinces:

Aderbeitzen (the ancient Media); Gangea and Daghistan (part of the ancient Iberia and Colchis); Ghilan, (part of the ancient Hyrcania); Shirvan; Mazanderan; Chusistan, (the ancient Susiana); Irac Agem, (the ancient Parthia); Chorasan, including Herat and Esterabad (part of the ancient Hyrcania); Sableustan (which includes the ancient Bactriana and Canhador); Sigistan (the ancient Drangiana; Mackeran; Kerman (the ancient Gadrassia); and Farsistan (the ancient Persis).

CHAP.

CHAP. XXVIII.

Of INDIA in general.

INDIA lies between 1 and 40 degrees of north latitude, and between 66 and 109 degrees of east longitude. It is bounded on the north by Usbec Tartary and Thibet; on the south by the Indian Ocean; on the east by China and the Pacific Ocean; and on the west by Persia and the Indian Ocean.

India, which consists of many kingdoms and nations, and territories belonging to different European powers, is generally considered as being divided into three parts; the Mogul Empire; Indostan, or the peninsula of India within the Ganges; and the further peninsula, or India beyond the Ganges.

The Great Mogul's Empire, considered separately from the peninsulas, is divided from the hither peninsula by the provinces of Guzarat, Decan, Golconda, and part of Orixa, which lie in a circular direction southward from the Gulf of Scindi to the south part of the province

vince of Bengal; and from the further peninsula by the provinces of Azem and Araca.

The Mogul Empire * is principally divided into Soret, Jessélmere Tata, or Scinda, Bucknor, Multan, Haican, Cabul, Cassimere †, Lahor ‡, or Pencah, Hendowns, Jengapour, Asmer, or Bando, Delhi §, Agra ‖, Gualeor, Navar, Ratipor, Chitor, Rotas, Gore, Necbal, Patna, Jesuat, Naugracut, Candish, which includes Berar, and part of Orixa, the country of the Marattas, and Bengal, which extends from the mouths of the river Ganges towards the head, more than 200 leagues. Bengal abounds with towns and villages on each side of the river, which derive great commercial advantages from navigable cuts. It is esteemed the storehouse of India, and is of itself ex-

* The imperial dignity of the empire is at present vested in Shah Zadah.

† Cassimere has by some been called the Paradise of the Indies; it is surrounded with high mountains; the town of Cassimere stands near a large lake.

‡ Lahor produces some of the best sugars in India.

§ Delhi contains the capital Delhi.

‖ Agra is one of the largest provinces in India: it contains 40 large towns, and 340 villages. Agra is the greatest city, and its castle is the largest fortification in India. The Dutch have a factory in Agra.

 tremely

tremely fertile, producing corn, rice, sugar-canes, salt-petre, and opium, in great abundance; it is likewise famous for its excellent civet. The British nation now possesses, in full sovereignty, the whole Soubahship * of Bengal, and the greatest part of Bahar; and in Orixa the district of Midnapour: in many other parts of the East-Indies they have likewise possessions and factories. The whole territorial acquisitions of the English in India exceeds 280,000 square miles. The principal English factory in Bengal is at Calcutta, and is called Fort William, which is situated on the river Hugley, the most western branch of the Ganges. Dacca is one of the largest towns of Bengal; Chednagore, formerly taken from the French, Cassumbazar, Chincura, Barnagua, Maldo, and others, are likewise places of great trade. The nabob keeps his court at Patna, the capital of Bengal. Benares, the Gentoo † university, is in the same province.

* Soubahships are divided into nabobships; the nabob is accountable to his soubah, and the soubah pays a certain tribute to the Great Mogul.

† The Gentoos, or Hindoos, are divided into four tribes, viz. the Bramins, or Priests; the Sitri, or military tribe, who frequently, however, follow other professions; the Berise, who are merchants, brokers, and shopkeepers; and

province. The ſpace between Bengal and China, with other diſtricts ſubject to the king of Ava, or Burmah, is now called the province of Mecklus.

Of INDOSTAN.

INDOSTAN, or the hither peninſula, is principally divided into Cambaya, or Guzurat, which contains Amedabad and Surat, Decan, or Viſapour *, and Kanora; Golconda;

and the Sudder tribe, who are menial ſervants. If any one is excommunicated from his tribe, he and his poſterity are for ever ſhut out from the ſociety of every other body in the nation, except the Hari caſt, who are held in utter deteſtation, and are only employed in the vileſt and meaneſt offices. The four mentioned claſſes are each divided into different claſſes, called Caſts, the order of pre-eminence in which is generally indiſputably decided in every particular city. The Gentoos moſtly feed upon rice. They are a harmleſs people, much bigoted to their religion. The Mahrattas are a warlike people, originally deſcended from the Gentoos. The Rohillas are another people of conſequence in India.

* Decan, or Viſapour, (conſidered as one) contains many kingdoms and provinces, among which are Baglana, Balagate, and Telenga. The weſtern part of Viſapour contains Konkan, in which the Portugueſe have ſettlements. An iſland, of about 27 miles in circumference, called Goa, having a town of the ſame name, and the rich province

Golconda *; part of Orixa; Biſnagar, or the Carnatic †; Meſſaur ‡; Tanjour §, and Madura ‖. The eaſt coaſt of the peninſula is called the Coromandel ** Coaſt, and the weſt coaſt the Malabar Coaſt ††.

province of Salzette, as its dependant, contain the principal of the Portugueſe ſettlements in the Eaſt Indies: Goa lies off the ſouth coaſt of Viſapour. The Engliſh iſland of Bombay, which is about 20 miles in circumference, containing a town of the ſame name, and a large harbour, lies off the north coaſt of Viſapour. The Engliſh factory of Corwar is on this coaſt, and Rajahpore, which belongs to the French.

* Rich in diamond mines.

† The late famous Hyder Ally and the Nabob of Arcot ſhared the greateſt part of the Carnatic between them.

‡ The country of the late Hyder Ally.

§ On the Malabar coaſt, towards Cape Comorin, (the moſt ſouthern part of the peninſula) it is famous for the pearl fiſhery.

‖ Tanjour lies eaſt of Madura. The ſoil is fertile, and its prince is rich. Within it lies the fort of Negapatnam, and the Daniſh ſettlement of Tranquebar. The capital is Tanjour.

** On this coaſt is Fort St. George, or Madras, Fort St. David, &c. belonging to the Engliſh; and Pondicherry, &c. belonging to the French. The town of Trincomale, an object of contention in the late war, is on the eaſtern ſhore of the iſland of Ceylon, towards the northern part.

†† On this coaſt the Engliſh have Callicut, Tellicherry, &c. &c.

Of

Of the Further PENINSULA.

THE further peninſula, or India beyond the Ganges, is principally divided into Acham, Ava, Aracan, Tonquin *, Laos, Pegu, Martaban, Siam, Cochin China †, Cambodia, Chiampa, and Malacca ‡.

* The Tonquineſe are ſaid to be revolters from the Chineſe. The capital of Tonquin is Cachao, in the north ſide of which the Engliſh have a flouriſhing houſe of trade.

† Laos, Cambodia, Chiampa, and other kingdoms and provinces, are ſubject to Cochin China.

‡ The Dutch are in poſſeſſion of the town of Malacca, and of a great part of the peninſula of Malacca, which contains many provinces.

The whole of India abounds with high mountains. Thoſe of Balagate, running from north to ſouth almoſt the whole length of India, are ſo high that they are ſaid to cauſe the rains to begin later on the Coromandel Coaſt, than on that of the Malabar, by ſtopping the weſtern monſoon.

CHAP.

CHAP. XXIX.

Of CHINA.

CHINA lies between 20 and 42 degrees of north latitude, and between 98 and 123 degrees of eaſt longitude. It is bounded on the north by Chineſe Tartary; on the ſouth and eaſt by the Eaſtern Ocean; and on the weſt by Tonquin, and the Tartarean countries of Thibet and Ruſſia.

China is known but very little to the Europeans. It is ſaid to be principally divided into 15 provinces, to the north of which is the great wall, which ſeparates the empire from Tartary. The wall is ſaid to be upwards of 20 feet high, and broad enough to admit five or ſix horſemen a-breaſt: its extent is reckoned to be 1500 miles. Without the wall is a province called Lyautong, under the ſame government with the provinces within the wall. China in general is a level country, bleſſed with fertility, and cultivated advantageouſly. The Chineſe have interſected their country with navigable canals, ſome of which are ſaid to extend ſeveral

hundred

hundred miles. The cities of Pekin, Nankin, and Canton, are the chief, the two firſt of which are ſuppoſed to contain more than four millions of inhabitants. China is famous for its raw ſilk, the tea plant or ſhrub, porcelain, and many productions and manufactures in common with India.

CHAP. XXX.

Of TARTARY in ASIA.

TARTARY in Aſia lies between 30 and 72 degrees of north latitude, and between 50 and 150 degrees of eaſt longitude, comprehending more than one half of the continent of Aſia. It is bounded on the north by the Northern Ocean; on the ſouth by the Caſpian Lake, Perſia, India, and China; on the eaſt by the Pacific Ocean; and on the weſt by Muſcovy. It is principally divided into the following Tartarean nations, who are moſtly deſcendants of the ancient Scythians, viz. Kamſchatka, Jakutſkoi, Bratſki, Thibet * and Mongul, Samoida, Oſtiack, Circaſſian and

* Near Patala, in the province of Thibet, on the top of a high mountain, the Dalai Lama, or great high prieſt, reſides, who is ſurrounded by other Lamas, and treated by all who approach him as a divinity.

Aſtracan,

Aſtracan, Siberian, Kalmuc, and Uſbec. The different tribes of Tartars are moſtly governed by a leader, whom they call their Khan; ſome of them are independent, and others acknowledge, and pay tribute to their powerful neighbours, who generally treat them with caution and lenity, as the friendſhip or enmity of a powerful people, inured to arms and hardſhips, without riches or valuable poſſeſſions to riſk, is of great conſequence.

CHAP. XXXI.

Of AFRICA.

THE interior parts of the Continent of Africa, and even a great part of the ſea coaſt, is unknown to the Europeans. The Weſtern Coaſt contains ſeveral European ſettlements, and ſome forts on the rivers Senegal and Gambia*. The Portugueſe are in poſſeſſion of a great part of the north-weſt coaſt. Guinea is diſtinguiſhed into the Gold Coaſt, Ivory Coaſt, Slave Coaſt, &c. Next to the

* Cape Verd, lat. 14° 45′ north, is nearly in the middle between the rivers Senegal and Gambia.

Slave Trade, Gold and Ivory are the principal articles of African commerce. Among other settlements on the Coasts of Guinea, the English trade to James's Fort; they exchange linen, woollen, hardware, and spirituous liquors, for slaves, ivory, &c. The settlements at and near the Cape of Good Hope belong to the Dutch. The northern coast of Africa, from the Atlantick Ocean to Egypt, includes what is called the Barbary Coast. The boundaries of the Barbary states, which contained the ancient Mauritania, Africa Propria, and the northern part of Lybia *, are severally as follow: *Morocco*, including *Fez*, is bounded on the north by the Mediterranean Sea; on the south, by the province of Taffilet, (which is tributary to Morocco); on the east, by the province of Segelmesa; and the State of Algiers; and on the west by the Atlantick Ocean. Fez, (now united to Morocco), lies between Algiers to the east, and Morocco to the south. The court of Morocco, is kept at Mequinez, a city of Fez, and the emporium of all Barbary. Sallee, a sea-port town of Morocco, latitude 34° 2' N. was once famous for its piracies; Tangier and Ceuta lie on the north coast of Morocco.

* Lybia extended southwards into Zaara, or the Desart.

Algiers is bounded on the north by the Mediterranean Sea; on the south, by Mount Atlas; on the east, by the State of Tunis; and on the west, by the State of Morocco and Taffilet. The town of Oran, once the object of great contention between the Spaniards and Moors, lies on this coast. The Town of Algiers is near the mouth of the river Safran, opposite to part of the Island of Majorca. *Tunis* is bounded on the north and on the east by the Mediterranean; on the south, by the State of Tripoli and by Biledulgerid, (the ancient Numidia *); and on the west, by the State of Algiers. Tunis is the most polished of the Barbary States, and the capital, Tunis, has some fortifications, and is about three miles in circumference; it is supposed to contain about three thousand tradesmens' shops, and ten thousand families. The State of Tunis contained the ancient Carthage, which was the capital of Africa Propria; it stood about fifteen miles west of the present town of Tunis; west from Carthage stood Utica; betwixt Utica and Carthage, ran the river Bagrada.

* The ancient Zama, in Numidia, is the place where Hanibal was defeated by Scipio.

 Tripoli,

Tripoli, including *Barca* *, is bounded on the north by the Mediterranean Sea; on the south, by the country of the Berriberies †; on the east, by Egypt; and on the west, by the State of Tunis, and by Biledulgerid and the territory of Gatamis. The town of Tripoli is surrounded with a wall and other fortifications.

Of EGYPT, (containing the ancient Misraim in Scripture.)

EGYPT lies between 23° 30′ and 31° 50′ of north latitude, and between 28° 40′ and 35° of east longitude. It is bounded on the north by the Levant Sea; on the south, by Nubia, from which it is separated by a chain of mountains; on the east, by the Red Sea and the isthmus of Suez; and on the west, by the Desarts of ancient Lybia.

Egypt is principally divided into two parts, Upper and Lower. Upper Egypt extends southward

* For the most part a barren desart; it included part of the ancient Lybia, in which were Cyrene, the chief city of Cyrenaica, Berinice, or Hesperis, with the famous garden of the Hesperides.

† From the authority of Mr. Guthrie.

ward from Grand Cairo, (lat. 30° N.) to Siene, (lat. 23° 30′). It contains Sayd or Thebes, (lat. 25°) once famous for its hundred gates, Copthos, (lat. 25° 24′), &c. Memphis ſtood about ten miles ſouthward of the weſt ſide of the river. Near Memphis, are the pyramids, * the moſt ſtupendous buildings in the world, ſuppoſed to be the burial places of the ancient Egyptian Kings. South-eaſt of the pyramids is the Lake Mœris, which was dug to contain the waters of the Nile when they roſe too high ‡; it alſo ſerved to diſtribute them in dry ſeaſons; theſe purpoſes were ſerved by means of canals. Near the Lake Mœris was the famous labyrinth, which, according to Herodotus and others, conſiſted of twelve palaces and 3000 houſes, built of marble, and all under ground, communicating with one another by innumerable winding paſſages and intricacies.

Lower Egypt includes all the country lying between Grand Cairo, the Levant Sea, the iſth-

* The canals near the pyramids, and other burial places, are ſuppoſed to have furniſhed the Greeks with the idea of their infernal rivers, Styx, Acheron, Cocytus, and Lethe. About 160 miles weſt of the pyramids, in the Lybian Deſart, ſtood the temple of Jupiter Ammon.

‡ The overflowing of the Nile was occaſioned by the periodical fall of rain about the ſummer ſolſtice.

mus of Suez, and Lybia. It contains Grand Cairo *, which is about a hundred miles from the mouth of the Nile, and about eight miles from its dividing into the two great branches which form the Delta †. About four miles northward of Grand Cairo ſtood Heliopolis ‡. Near the mouth of the eaſtern branch of the Nile ſtood Damietta ||, the ancient key of Egypt. About ninety miles weſt of Damietta, near the mouth of the weſtern branch of the Nile, ſtood Roſetta. About twenty miles ſouth-weſt of Roſetta, by the north part of the Lake Mareotis §, ſtood the famous City of Alexandria ¶, North of Alexandria, in the iſland of Pharos, was a tower near four hundred feet high; on the ſummit was a vaſt mirror of poliſhed ſteel, ſo diſpoſed as to preſent the

* The port of Grand Cairo is called Boulac.

† So called from its reſemblance to the pyramidical figure of that letter in the Greek alphabet, Δ.

‡ Both this place, and Heliopolis in Syria took their names from containing temples dedicated to the ſun.

|| The preſent Damietta is about four miles ſouth of the place of ancient Damietta.

§ The waters of this lake are now dried up.

¶ Modern Alexandria is a place of ſmall extent, ſcarcely containing 6000 inhabitants.

image

image of distant vessels before they were visible to the eye; at night it was lighted up, to prevent the danger that ships might otherwise run into, by approaching too near the coast. Pelusium stood (in about lat. 31° N.) at the eastern part of a lake, called Menzale *. In the eastern part of Lower Egypt is the land anciently called Goshen, where the Israelites dwelt.

CHAP. XXXII.

Of AMERICA.

AMERICA was discovered in the year 1492, by Christopher Columbus, a Genoese, in the service of Spain. Columbus entertained true notions of the figure of the earth, and was instigated by the successes of the Portuguese to become an adventurer. He entertained a strong persuasion that the Atlantick Ocean might lead to unknown countries, and that a passage to the East Indies and China might be found westward. He preferred a petition at Genoa, to get employed in pursuing such discoveries; but it was rejected, as being entirely chimerical; he afterwards tried France, England, and

* The Lake Menzale contained four of the seven mouths of the Nile.

 Portugal,

Portugal, with as little ſucceſs; Spain was his laſt reſource; and after eight years attendance there, (having been much rallied and abuſed), he accompliſhed his deſires by means of a Monk and two other Churchmen, who prevailed on Queen Iſabella, from a motive of religion, to favour his pretenſions. He ſet ſail with three ſmall veſſels, and on the thirty-third day from his departure, after ſtruggling with many difficulties, from the variation of the compaſs, and the mutiny of his men, who threatened to throw him overboard, he, luckily for himſelf, diſcovered one of the Bahama Iſlands, and after that Cuba and Hiſpaniola. At the end of about nine months he returned to Spain, with a quantity of gold, and ſome of the natives, and received the higheſt honours and preferments. He was equipped for a ſecond voyage, with ſeventeen ſail of ſhips, which contained ſtores and men, ſufficient for the purpoſe of laying the foundation for a colony, and he a ſecond time landed on the Iſland of Hiſpaniola, where he erected forts, and took all precautions to ſecure the dependance of the natives. He then left Hiſpaniola, and made towards Cuba, in coaſting along which he diſcovered multitudes of iſlands, and among the reſt Jamaica. The admiration of his ſucceſſes excited envy, and tempted calumny, for he was falſely accuſed of having ill deſigns,

designs, and an officer was dispatched from Spain as a spy upon his conduct. He returned of his own accord to Spain, and obviated the reproaches with which he had been loaded. His innocence removed all but jealousy, and he was equipped a third time for further discoveries. In a few weeks he passed the Island of Trinidad, and discovered the continent of South America, at the mouth of the river Oroonoko; thence he thought proper to proceed again for Hispaniola, in the passage to which he landed at several places. His enemies again set every spring in motion that could injure him, and by their evil machinations, he was treated as a traitor, and brought to Europe in chains. He was, after a time, honourably acquitted, but it is said, he would never part with the shackles with which he had been loaded. After a fourth voyage, in which he encountered extreme dangers, and miraculously procured provisions for his famishing people from the natives of Jamaica, by predicting an eclipse of the moon, which was then about to happen, he returned to Spain; his protectress Isabella was then dead; Ferdinand, her husband, gave him fair words, but nothing else. He died at Valladolid, weighed down with grief and infirmities, desiring his chains to be buried with his body. What Columbus had obtained by good

good ſenſe and humanity, future governors purchaſed with blood and barbarity, for ſo proceeded the Spaniards to revel in their acquiſitions.

When the Spaniards began to acquire new poſſeſſions, other powers were ſtimulated in the ſame purſuits. The Portugueſe diſcovered the Brazils, and Cabot, a native of Briſtol, diſcovered the North-eaſt coaſt of North America, which now compaſſes the United States. America is ſaid to take its name from Americ Veſpucci, a Florentine merchant, and man of addreſs, who made diſcoveries on the Southern Continent.

NORTH AMERICA.

Of New Britain.

NEW Britain *, called alſo the country of the Eſquimaux, is that part of North America which lies round Hudſon's Bay, extending from Canada northward towards the Pole. In Guthrie's Geographical Grammar, its dimenſions are laid down as 850 miles in length, and 750 in breadth.

* New Britain, New North and South Wales, New Denmark, &c. are very thinly inhabited, and but very little known.

CHAP.

CHAP. XXXIII.

Of CANADA, (called alſo the Province of Quebec.)

CANADA lies between 45 and 52 degrees of north latitude, and between 61 and 81 degrees of weſt longitude. It is bounded on the north and eaſt by New River and Hudſon's Bay; on the ſouth, by New England and New York; and on the weſt, by unknown lands. Its capital, Quebec, is ſituated at the confluence of the rivers St. Lawrence and St. Charles, about 320 miles from the ſea: it is built on a rock, and ſtrongly fortified, and has a ſafe and commodious haven. The town of Montreal is ſurrounded with a dry ditch, and fortifications; it is about 170 miles ſouth-weſt of Quebec, at the foot of a mountain of the ſame name, on an iſland in the river St. Lawrence; it is about a mile and a half from the ſouth ſhore: the iſland is 30 miles in length, and 12 in breadth. Montreal was famous for a great fair, which laſted two or three months, and was reſorted to by different tribes of Indians, from the diſtance of many hundred miles. The town,

Trois Rivieres, ſo called from three rivers which join their currents there, and unite with the river St. Laurence, is traded with by ſeveral nations of Indians, who come down the rivers to exchange peltry for other commodities.

The great river St. Lawrence is the outlet of the Lakes of Canada through the Lake Ontario; at its mouth it is about 90 miles wide, and is navigable to the largeſt veſſels 400 miles from the ſea; it contains many fertile iſlands, among which are thoſe of Richelieu. The river near Quebec, from the breadth of about twelve miles, ſuddenly narrows to only one. The Canada Lakes are five, viz. Lake Superior, which is 15,000 miles in circumference; Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario, the ſmalleſt of which is 600 miles in circumference; theſe lakes all communicate. Between Erie and Ontario is that ſtupendous cataract, called the Falls of Niagara; the perpendicular fall is 150 feet, and the breadth of the falling ſtream half a mile.

CHAP.

CHAP. XXXIV.

Of NEW SCOTLAND.

NEW Scotland lies between 44 and 49 degrees of north latitude, and between 60 and 67 degrees of east longitude. It is bounded on the north by the river St. Lawrence; on the south, by the Atlantick Ocean; on the east, by the Gulf of St. Lawrence and the Atlantic Ocean; and on the west, by Canada and New England. The capital, Halifax, stands by Chebucto Bay; it has an intrenchment, which is strengthened by forts of timber. A small squadron of ships, under the command of a Commodore, are constantly stationed at Halifax, to protect the fisheries, and to prevent other encroachments. During the winter they are laid up in the harbour. Annapolis Royal is another town of Nova Scotia; St. John is a new settlement at the mouth of a river of the same name *. The Loyalists have planned several new towns, among which, the town of Shelburne, which takes the lead, is said to con-

* The other river St. John is north of the river St. Lawrence.

tain

tain 9000 inhabitants; the eastern and southern parts of Nova Scotia are now called the government of New Brunswick *.

The lakes of Nova Scotia are numerous.

CHAP. XXXV.

Of the UNITED STATES OF AMERICA.

THE United States are situated between about 31 and 48 degrees of north latitude, and between 67 and 90 degrees of west longitude, being about 1200 miles from north to south; the breadths are unequal, from 150 to 700 miles. The United Provinces are the thirteen following: New Hampshire, Massachusetts Bay, Rhode Island, and Providence Planta-

* New Brunswick is furthermore made to extend westward from the river St. Croix to its source, and thence to the southern boundary of the province of Quebec. The whole boundaries were politically determined in the year 1784, and so particularly as to prevent future disputes with the United States of America, in ascertaining the western boundaries of New England and of New York, as far as the northern part of the Lake Ontario.

tions,

tions, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia *.

Of NEW ENGLAND.

NEW England lies between 41 and 49 degrees of north latitude, and between 67 and 74 degrees of west longitude. It is bounded on the north by Nova Scotia; on the south, by New York; on the east, by the Atlantick Ocean; and on the west, by the British territories on the east side of the river St. Lawrence. New England is principally divided into four states. The *State of Massachusetts* contains many towns, among which are, Salem, Newbury Port, Dartmouth, Plymouth, Cambridge, (in which is Havard College and Stoughton Hall,) and *Boston*, the capital, which is situated on a peninsula at the bottom of Massachusett's Bay, the entrance of which is rocky, and contains several small islands, on one of which is Fort William, the most regular and defensible fortification of all the states. The greatest part of the town of Boston lies round its harbour, in

* The four first mentioned provinces of the United States are in New England.

a semi-

a ſemicircular form. Boſton and Cambridge are about four miles apart. The *State of New Hampſhire* lies north; it contains Portſmouth, &c. The *State of Rhode Iſland and Providence Plantations* lies ſouth; Rhode Iſland contains Newport, &c. The *State of Connecticut* lies weſt; it contains New London, Hertford, &c.

New England contains many fine rivers, among which are the Connecticut and Thames, and many capes, bays, and harbours, the moſt remarkable of which are formed by Rhode Iſland, the Providence Plantations, and Plymouth.

Of NEW YORK.

NEW York lies between 40 and 46 degrees of north latitude, and between 72 and 76 degrees of weſt longitude. It is bounded on the north by the Britiſh territories on the eaſt ſide of the river St. Lawrence; and by New England; on the ſouth and ſouth-weſt, by the river Hudſon and Delaware; and on the eaſt, by New England and the Atlantick Ocean. The State of New York contains the Iſland of New York, which is about twelve miles long, and three broad. At the ſouth-weſt end, in the mouth

mouth of Hudſon's river, is the town of New York, which, together with its harbour, is defended by a fort and battery. The State likewiſe contains Long Iſland and Staten Iſland; and is divided into ten counties. The Mohawk River in New York has a large cataract; the cape, called Sandy Hook, is at the entrance of Rariton River.

Of NEW JERSEY.

NEW Jerſey lies between 39 and 43 degrees of north latitude, and between 74 and 76 degrees of weſt longitude. It is bounded on the north by Hudſon's River, and by the Sound, which ſeparates Staten Iſland from the Continent; on the eaſt and ſouth-eaſt, by the Atlantick Ocean; and on the weſt and ſouth-weſt by Delaware River and Bay.

New Jerſey is divided into 13 counties; among the chief towns are, Burlington, Perth Amboy, New Brunſwick, and Princetown, in which there is a college.

Of PENNSYLVANIA.

PENNSYLVANIA lies between 39 and 44 degrees of north latitude, and between 74 and 81 degrees of west longitude. It is bounded on the north by the country of the Iroquois or Five nations; on the south and west, by Maryland; and on the east, by the Delaware River, which divides it from the Jerseys. Pennsylvania is principally divided into 12 counties, three of which, now called the Delaware State, form a distinct government: they are situated westward of the mountains on the banks of the river Ohio, on the south-east and east part of Lake Erie; they were purchased by Mr. Penn in 1768, and established in the year 1771. The city of Philadelphia, the most beautiful of any in America, (said to be unequalled by any in Europe for regularity) is in the county of Philadelphia. Its situation is 100 miles from the sea, between two navigable rivers, Delaware and Schuylkill, the streams of which are about two miles apart; the Delaware is here about a mile in breadth. Canals, which unite with both rivers, run through the principal streets of the city. The other principal towns of Philadelphia are, German Town, Oxford, Radnor, Chester, &c.

Of MARYLAND.

MARYLAND is situated between 37 and 40 degrees of north latitude, and between 75 and 80 degrees of west longitude. It is bounded on the north by Pennsylvania; on the south by Virginia; on the east by Pennsylvania and the Atlantic Ocean; and on the west by the Apalachian mountains. Maryland is divided into two parts, east and west, by the bay of Chesapeak *. These two divisions contain 14 counties. Maryland contains many navigable creeks and rivers: among the rivers are the Patowmac, Severn, and Sassafras. The chief town is Annapolis.

Of VIRGINIA.

VIRGINIA lies between 36 and 40 degrees of north latitude, and between 75 and 90 degrees of west longitude. It is bounded on the north by several Indian nations, and by Maryland, from which it is separated on the north-east by the river Patowmac; on the south

* The river Chesapeak runs about 300 miles up the country: for a considerable way its greatest breadth is about eighteen miles, and its narrowest about seven.

by North Carolina; on the east by the Atlantic Ocean; and on the west by the great river Mississippi †. Virginia is principally divided into 24 counties. Among the principal towns are Williamsburg, James Town, and York Town. Ships in sailing either to Virginia or Maryland pass two points of land, called the Capes of Virginia, between which is the passage into the bay of Chesapeak. James river, York river, the Potawmac, &c. empty themselves into the bay. Virginia, from its many navigable rivers, has the greatest commercial advantages. Formerly almost the whole northern coast of America took the name of Virginia.

Of NORTH and SOUTH CAROLINA, with GEORGIA.

NORTH and South Carolina, with Georgia, lie between 30 and 37 degrees of north latitude, and between 76 and 91 degrees of west longitude. They are bounded on the north by Virginia; on the south by the river St. John, which

† The Mississippi, with its windings, is supposed to run a course of 4,500 miles. It is navigable for small craft almost to its source; its mouth, however, is so choaked with sands and shoals as not to admit of vessels of large burden.

separates

ſeparates Georgia from Florida; on the eaſt by the Atlantick Ocean; and on the weſt by the river Miſſiſſippi. North Carolina is principally divided into two parts, one of which contains the town of Wilmington. South Carolina, which contains Charles-Town and Port-Royal, is principally divided into five parts. Georgia is not principally ſubdivided: it contains the town of Savannah. Among the principal rivers in theſe States are Clarendon River, Albemarle River, Savannah or George River, and St. Mary's, which divides Georgia from Florida. The weſtern parts are watered by the Cherokees, Mobile, Pearl River, and many others, which (in a little more than 35 degrees of latitude) fall into the Miſſiſſippi. Hatteras is a noted cape; as is likewiſe Cape Fear, and Cape Carteret, which both lie ſouth of it.

CHAP. XXXVI.

SPANISH Dominions in NORTH AMERICA.

Of EAST and WEST FLORIDA.

EAST and Weſt Florida lie between 25 and 32 degrees of north latitude, and between 80 and 91 degrees of weſt longitude. They are

 bounded

bounded on the north by Georgia; on the south by the Gulf of Mexico; on the east by the Straits of Bahama; and on the west by the river Mississippi. The capital of East Florida is St. Augustine. It is defended by a castle called Fort St. John, and enclosed by a ditch fortified with bastions. The capital of West Florida is Pensacola, which is situated within a bay of the same name.

Of LOUISIANA.

LOUISIANA is an immense country, extending from the banks of the Mississippi westward. Its limits are undetermined. The town of the greatest note is New Orleans, which lies near the mouth of the Mississippi.

Of NEW MEXICO and CALIFORNIA.

THEY lie between 23 and 43 degrees of north latitude, and between 94 and 126 degrees of west longitude. They are bounded on the north by unknown lands; on the south by Old Mexico and the Pacific Ocean; on the east by Louisiana; and on the west by the Pacific Ocean. The capital of New Mexico is Santa Fe, and of California St. Juan.

Of

Of OLD MEXICO, or NEW SPAIN.

OLD Mexico, or New Spain, lies between 8 and 30 degrees of north latitude, and between 83 and 110 degrees of west longitude. It is bounded on the north by New Mexico, or Granada; on the north-east by the Gulf of Mexico; and on the south-east and south-west by Terra Firma and the Pacific Ocean. Old Mexico is principally divided into three parts, called Audiences. One of them, called Mexico Proper, contains the town of Mexico, and the port towns of Acapulco and Vera Cruz. The other audiences are Galicia, or Guadalajarra, and Guatimala *, each having a town of its own name. The capital, Mexico, which is situated in the center of a lake, carries on a trade with Europe and the West Indies by Vera Cruz, and with the East Indies by Acapulco.

* Guatimala was swallowed by an earthquake in the year 1773: it is supposed that 8000 families perished with it. New Guatimala is built at some distance from the place of the old town.

CHAP. XXXVII.

SPANISH and other Dominions in South America.

Of TERRA FIRMA, or CASTILE DEL ORO.

TERRA Firma lies between the Equator and 12 degrees of north latitude, and between 60 and 82 degrees of weſt longitude. It is bounded on the north by the Carribbean Sea; on the ſouth by the country of the Amazons, and by Peru; on the eaſt by the Atlantic Oecean, and by Guiana; and on the weſt by Old Mexico, and by the Pacific Ocean. The chief towns of Terra Firma are Porto Bello and Carthagena on the northern coaſt, and Panama on the ſouthern coaſt. Theſe towns have annual fairs for American, Indian, and European commodities.

Of PERU.

PERU lies between the Equator and 25 degrees of ſouth latitude, and between 60 and 81 degrees of weſt longitude. It is bounded on the north by Terra Firma; on the ſouth by Chili;

Chili; on the east by the Cordelera mountains; and on the west by the Pacific Ocean. The chief towns are Lima, Callao, Quito, Cusco, and Potosi, which contains a very rich silver mine. Most of the gold mines are in the north part of Peru; the silver mines are in the south. A fifth part of the produce of the mines belongs to the King of Spain.

Of CHILI.

CHILI lies between 25 and 45 degrees of south latitude, and between 65 and 85 degrees of west longitude. It is bounded on the north by Peru; on the south by Patagonia; on the east by La Plata; and on the west by the Southern Ocean. Chili is divided into two parts by the Andes mountains. The east side is called Cuajo, or Cutio; and the west side Chili Proper, which contains the town of St. Jago.

Of PARAGUAY, or LA PLATA.

PARAGUAY lies between 12 and 37 degrees of south latitude, and between 50 and 75 degrees of west longitude. It is bounded on the north by Amazonia; on the south by Patagonia;

gonia; on the east by Brazil; and on the west by Peru and Chili. The chief town is Rio de La Plata. The great river La Plata is in this province; the width of it at the entrance is about 150 miles. Cape Antonio is at the north entrance, and Cape St. Mary at the south entrance.

The four last mentioned provinces belong to Spain.

Of BRAZIL.

BRAZIL lies between the Equator and 35 degrees of south latitude, and between 35 and 60 degrees of west longitude. It is bounded on the north by the mouth of the great river Amazon and the Atlantic Ocean; on the south by the river La Plata; on the east by the Atlantic Ocean; and on the west by a chain of mountains, which divide it from Paraguay and the country of the Amazons. On the coast there are three small islands, where ships touch for provisions in their voyage to the South Seas, viz. Fernando, St. Barbara, and St. Catharine's. The chief towns of Brazil are St. Sebastian, Fernambuco, Rio Janeiro, and St. Salvador, or Bahia. The river Amazon near its mouth is about

about 80 miles wide. The mouth of the river Para, which is east of the same, is about 40 miles. Brazil belongs to Portugal.

Unknown Parts of SOUTH AMERICA.

THE country of Guiana, which extends from the equator to the eighth degree of north latitude, bounded by the great river Oroonoko on the north, and Amazonia on the south, is unknown, except along the coast, where the French at Cayenne, and the Dutch at Surinam, have made some settlements.

Amazonia, which is situated between Peru and Brazil, have never been thoroughly discovered.

Patagonia, at the southern extremity of America, sometimes described as a part of Chili, hath no settlements, neither hath Terra del Fuego, the Falkland Islands, nor other inferior ones at the southern extremity.

CHAP. XXXVIII.

A particular Deſcription of ſeveral principal Islands.

European Islands.

ICELAND is about 400 miles long, and 180 broad. It contains a volcano, called Mount Hecla, which is conſtantly throwing up flames and ſulphur, and torrents of boiling water: it is notwithſtanding this almoſt covered with ſnow. This iſland is ſuppoſed to contain about 80,000 inhabitants.

The *Faro Iſlands* are about 24 in number. They lie in a cluſter, and take their name from their inhabitants ferrying from one to another. The number of people in theſe iſlands are ſuppoſed to be about 4000.

The *Orkney Iſlands* are about 30 in number. They are ſeparated from Caithneſs by the Pentland Firth, which is dangerous to mariners, from the rapidity of its tides. The largeſt of theſe iſlands is Pomona, which is about 24 miles

miles long, and nine broad. It contains Kirkwall and Stromneſs, and has the remains of a Druid temple.

The *Shetland Iſlands* are about 46 in number, the largeſt of which is Mainland, which is about 60 miles long, and 20 broad. It contains Larwick and Skalloway.

The *Hebrides* are very numerous, and ſome of them very large. Many of them are diſtinguiſhed for their remains of antiquity, particularly Iona, or Columb Kill, which was anciently the ſeat of weſtern learning, and the burying-place of ſeveral kings of Scotland, Ireland, and Norway. This iſland, and another ſmall one called Staffa, famous for its ſubterraneous hall and ſtupendous pillars, are both weſt of the iſland of Mull. *Mull*, *Iſla*, and *Jura*, are weſt of Argyleſhire, *Bute* and *Arran*, which form the ſhire of Bute, are ſouth of the ſame. The other principal iſlands are *Sky*, which is weſt of Roſsſhire, and *Lewis* and *Harris* *, *North Uiſt* and *South Uiſt*, all which lie from north-weſt to ſouth-weſt of Sky Iſland. The ſmall iſland of Kilda, or Hert, is the moſt weſterly of all the Hebrides.

* Lewis and Harris form but one iſland.

The

The *Isle of Man* (anciently a kingdom) contains four port towns, Castletown, Peele, Douglas, which has an excellent harbour, and Ramsey, which has a spacious bay. Near the southern promontory of the Isle of Man there is an island about three miles in circumference, called the Calf of Man.

The Isle of Anglesea was treated of with Wales.

The *Isle of Wight* is divided into 30 parishes. The towns were mentioned with those of Hampshire, to which it belongs. Carisbrook Castle is in this island. Charles I. was confined here, and after his execution some of his children. The number of inhabitants in this island, according to a late survey, amounted to more than eighteen thousand.

Jersey, anciently Cæsarea, is famous for its honey, and for the manufacture of stockings. It is about 12 miles in length. Its principal town is St. Helier, or Hilary. This island is allowed by charter to retain certain privileges, agreeable to the old Norman institution. The north side of the island is almost inaccessible, by means of

lofty

lofty cliffs. The south side is almost level with the water.

Guernsey is about 13 miles from north-east to south-west, and about 12 miles from east to west where broadest. The harbour of Guernsey is called St. Peter le Port: it is guarded by two forts.

The small islands of *Alderney* and *Sark* are dependants on Guernsey.

Sardinia gives a royal title to the Duke of Savoy. Its capital, Cagliari, is an archbishopric, an university, and the seat of the viceroy. His Sardinian Majesty's annual revenue from this island is not supposed to exceed 5000 l. sterling.

The islands of Corsica, Majorca, Minorca, and Ivica, as belonging to foreign powers, have nothing sufficiently interesting to require a particular description.

Sicily was once the granary of Italy: it now continues to supply Naples and other parts with corn, but its cultivation is much neglected. The famous volcano, Mount Etna, which has so often destroyed whole towns and villages,

villages, is in this island. Its circumference is about 60 miles: its figure is circular, and tends towards a point; the height of the summit is computed to be 10,954 feet. The lower parts of it are very fruitful, the middle abounds with woods, and the upper parts are covered with snow. The town of Messina * gives name to the strait between Sicily and the Continent. Several small islands north of Sicily are volcanoes, among the principal of which is Strombolo.

Capri, or Caprea, Ischia, and other small islands on the coasts of Italy, have little else than ruins to distinguish them.

Malta, formerly called Melita, is in about 35° 15′ of north latitude, and 15° of east longitude. On this island the Apostle St. Paul was shipwrecked. It is now famous for being the residence of the Knights of St. John of Jerusalem, called the Knights of Malta.

The islands of Lusiana, Corfu, &c. belonging to the Venetians, have nothing sufficiently interesting to require a particular description.

* Near Messina is the rock Scylla and the whirlpool Charybdis, celebrated by some of the poets.

Zant,

Zant, however, is famous for the produce of currants and grapes, and Ithaca for being the island of Ulysses.

Negropont, the ancient Eubœa, is about 90 miles long, and 25 broad. Here the Turkish galleys lie.

Lemnos, or Stalimene, is about 25 miles long, and nearly of the same breadth. It is a fertile island, and contains mineral earth, from which the Turks derive a considerable revenue.

Tenedos is only famous from its lying opposite to where Old Troy stood.

Scyros is remarkable for its remains of antiquity, and for being the place where Achilles was educated, and where Theseus died in exile.

Lesbos, or Mytelene, is famous for being the birth-place of many philosophers and poets.

Scio, or Chios. This island is about 100 miles in circumference. It has in it a Turkish garrison. Sundry manufactures of silk, velvet, &c. are carried on in it, and it is famous for its produce of mastick.

Samos was the birth-place of Pythagoras: it lies opposite to Ephesus.

Patmos, south of Samos, is a rocky island, about 20 miles in circumference. It is only famous as having been the residence of St. John when he wrote the book of Revelations.

The *Cyclades Islands* lie in a circle round *Delos,* which is famed as having been the birth-place of Apollo and Diana, the ruins of whose temples are still visible.

Paros is noted for the beauty and whiteness of its marble, and for many remains of antiquity.

Cerigo, or Cytherea, is south-east of the Morea. It is about 50 miles in circumference. It is only remarkable as being the favourite residence of Venus.

Santorin, anciently Calista, or Thera, is one of the most southerly islands in the Archipelago. Near this island is another of the same name, which arose out of the sea in 1707. Its produce was attended with an earthquake, thunder and lightning, and a boiling of the sea for several days. When it first made its appearance it

it was a mere volcano. It is about five miles in circumference.

Rhodes is famous for having contained the brass Colossus, one of the seven wonders of the world. It is about 60 miles long and 50 broad. The harbour, which was between the feet of the Colossus, is now the principal arsenal for the shipping belonging to the Grand Seignior. Rhodes, its principal town, is about three miles in circumference.

Candia, the ancient Crete, once famous for its hundred cities, and for being the birth-place of Jupiter. The famous mount Ida, which is a barren rock, stands in the middle of the island. The river Lethe, famous for the labyrinth built by Dædalus, is in this island. About the year 1669 the island was besieged by the Turks, who took it after having lost 200,000 men.

Cyprus is about 150 miles long and 70 broad. During the time of the Crusades it was a flourishing kingdom. Paphos, the ancient seat of pleasure and corruption, is one of the divisions of the island. Mount Olympus is also contained in it.

The *Japan Islands* form an empire. The Chinese and Dutch are the only nations the natives suffer to trade with them, and these are under severe restrictions. The Japanese are famous for lacquer wares.

The *Ladrone Islands* are about 12 in number. The chief are Guam and Tinian, on which Anson landed. Formosa, east of China, and Anian, or Hainan, in the Gulf of Cochin China, both belong to the Chinese. They contain nothing remarkable.

The *Philippine Islands* are about 1200 in number. They were first discovered by Magellan, who was slain in a skirmish with the natives in 1521. The chief of the islands is Manilla, or Luconia. These islands are extremely fruitful, and afford rich trade to the Acapulco ships. In the mountains of some of these islands, where water is most wanted, there are canes and trees which supply it.

The *Moluccos*, or Clove Islands, are five in number. The Dutch have two forts in these islands.

The

The *Banda*, or Nutmeg Iſlands, are five in number. Theſe are the only iſlands where nutmegs are known to grow.

Amboyna, famous for the cruelties exerciſed by the Dutch upon the Engliſh in the year 1622. The Dutch have a garriſon and forts in this iſland to protect their clove plantations.

Celebes, or Macaſſar. The chief produce of this iſland is pepper and opium. The Dutch have a fortification on this iſland. The internal parts are governed by three kings, the chief of whom reſides in the town of Macaſſar.

Gilolo and *Ceram* are ſpice iſlands, in which the Dutch have fortifications.

The Sunda Islands.

Borneo is 800 miles long and 700 broad. The ſea-coaſts of this iſland are moſtly governed by Mahometan princes. The inhabitants trade with all nations.

Sumatra is 1000 miles long, and 100 broad. It produces much gold. The Engliſh Eaſt-India Company have two ſettlements here, Bencoolen and Fort Marlborough, whence they bring their

chief cargoes of pepper. The cassia tree grows in a part of this island. There is a mountain in the island called Ophir, said to exceed the peak of Teneriffe in height by 577 feet. The King of Achen is the chief of the Mahometan princes who possess the sea coasts.

Java. The Dutch have settlements on this island: that at Batavia is the principal of all their possessions in the East Indies. Their governor here lives in the greatest splendor and magnificence.

The *Andaman* and *Nicobar* Islands. These are small, but very numerous; they furnish ships which touch at them with tropical fruits.

Ceylon is one of the richest and most fertile islands in the world. It is about 250 miles long, and 200 broad. The island produces things common with other places in the East, but cinnamon is one of its chief productions. Candy, the capital, stands on a mountain in the middle of the island. Here the king of the island resides; but his power is said to be very much circumscribed by the Dutch, who are in possession of the greatest part of the island. The Dutch were invited by the natives to defend them

them against the Portugueze, whom they expelled, and established themselves. Trincomale, the chief port on this island, was lately part of the seat of war between the Dutch, English, and French. It is now again, by treaty, in the possession of the Dutch.

Maldives and *Lackdives* are very numerous, but can be called little else than rocks; some of them, however, are noted for fine cocoa trees.

Bombay and *Goa* have been treated of in the description of the East Indies.

The *Kurile Islands* are more than twenty in number. They are in general mountainous, and many of them contain volcanoes and hot springs.

Madagascar, the largest of the African islands, is above 900 miles in length, and upwards of 200 miles in breadth. European ships, in their passage to and from India, generally pass between this island and the continent of Africa. Madagascar is not subject to any foreign power, but is governed by many different princes, chosen from among themselves. This island is in general fertile and pleasant.

Zocotora is about 80 miles long, and 54 broad. The inhabitants are of Arab extraction. They have two good harbours, where British ships have sometimes put in. The island produces fruits, aloes, frankincense, and gum.

Babelmandel is not above five miles in circumference, and is only a barren, sandy spot of earth. The strait to which this island gives name was, before the discovery of the Cape of Good Hope, the only passage through which the commodities of India found their way to Europe.

Comora Islands. The principal of these islands is 30 miles long, and 15 broad. It affords plenty of provisions and fruits, and ships bound to Bombay generally touch here for refreshments. The inhabitants are an hospitable negro people, of the Mahometan persuasion.

Mauritius is about 150 miles in circumference. It produces many valuable commodities, and has a convenient and safe harbour. This island is in general mountainous, and has many fine rivulets.

Bourbon is about 90 miles round. Some of its

its ſhores are dangerous, from rocks juſt beneath the ſurface of the water. On the ſouthern extremity of the iſland there is a volcano which continually makes a roaring noiſe, and throws out flames. This iſland is in general fruitful, and is the place where the French Eaſt-India ſhips touch at to take in refreſhments.

There are many inconſiderable iſlands diſperſed near the African iſlands already deſcribed.

St. Helena is about 21 miles in circumference. It is rocky, lies high, and is acceſſible only at the landing-place, which is in a ſmall valley on the eaſt ſide, defended by batteries of cannon, placed level with the water. There is no anchorage about the iſland but at a ſituation called Chapel Valley Bay. If a ſhip overſhoots this iſland in its paſſage to Europe, it cannot recover it again, on account of the ſtrong ſouth-eaſt wind which conſtantly blows there. The iſland contains about 200 families, moſtly deſcended from Engliſh parents. The Engliſh Eaſt-India homeward bound ſhips take in water and freſh proviſions here. The Company's affairs here are managed by a governor, deputy-governor, and ſtore-keeper, who have ſtanding ſalaries, and a public table, well furniſhed, to which

which all commanders, masters of ships, and principal passengers are welcome.

Ascension is about twenty miles in circumference; it is, in general, mountainous and barren, and is not inhabited, but it has a safe and convenient harbour; and the East India ships generally touch here to furnish themselves with turtle, which they find in great plenty.

St. Matthew, St. Thomas, Anaboa, Princes Island, and *Fernandopo*, have nothing that requires a particular description.

Cape Verd Islands, are so named from being opposite to Cape Verd, on the African coast; they are about 20 in number, but some of them are only barren and uninhabited rocks. *St. Jago* is the most fertile of them, it is about 150 miles in circumference; madder grows here in great plenty among the cliffs; outward-bound ships often touch here for refreshments. The Portuguese have a Viceroy stationed in this island. The other Cape Verd Islands of any note, are, *Mayo*, *Fogo*, (a volcano), and *Goree*, which belongs to the French.

Canaries, (anciently called the Fortunate Islands), are seven in number. The one called

the *Grand Canary*, is about 150 miles in circumference, and is extremely fruitful. *Teneriffe*, the next largest island, is about 120 miles in circumference, and is, in general, fertile; it is very remarkable for its Peak, which, at the bottom is about 15 miles in circumference; it rises gradually in the form of a sugar loaf; the perpendicular height of it is about three miles above the surface of the sea, from which it serves as a sea mark. The Canaries are famous for the wine to which they give name.

Madeiras are three in number, the largest, called Madeira, is about 180 miles in circumference; it forms one continued hill from east to west, the declivity of which on the south side is cultivated and interspersed with vineyards. In the midst of the slope the merchants have fixed their residence. Funchal, which is the only town in the island, is on the south side, at the bottom of a large bay; towards the sea it is defended by a high wall, with a battery of cannon. Porto Santo, another of the islands, is about eight miles in circumference, and is extremely fertile; the other island is only a small, barren, rock. The Madeiras are famous for the wine to which they give name.

Azores,

Azores, are nine in number, named Santa Maria, St. Michael, Tercera, St. George, Graciosa, Fayal, Pico, Flores, and Corvo. These islands are fertile, but often suffer from earthquakes and inundations. St. Michael, the largest, is about 100 miles in circumference, and contains about 50,000 inhabitants. Tercera has a good harbour, and contains the town of Angra, in which is a cathedral and five other churches. The Governor of the islands resides here, as does likewise the Bishop.

Newfoundland is mostly valuable for the cod fishery carried on upon the shoals or sand banks, which lie east and south-east of the island. By the last treaty of peace, the French are allowed to enjoy the fisheries on the north and west coasts of the island. The chief towns in Newfoundland are, Placentia, Bonavista, and St. John; but not more than 1000 families remain here in the winter, from the extreme cold and foggy air.

Cape Breton is, in general, very barren. The harbour of Louisbourg, the chief town, is above ten miles in circumference.

St. John is about 60 miles in length, and 30 or 40 in breadth; it is much more fertile than the two laſt mentioned, for it furniſhes a great quantity of corn, and many cattle are bred in it.

Bermudas, or *Summer Iſlands*, are ſurrounded with rocks, which make them difficult of acceſs. The number of inhabitants there are about 10,000; they moſtly employ themſelves in building and navigating light ſloops and brigantines between North America and the Weſt Indies. The town of St. George is at the bottom of a haven, defended by ſeveral forts, and a great quantity of cannon.

Lucay's, or *Bahama Iſlands*, are about 500 in number, but ſome of them are mere rocks; only twelve of them are of note, from either ſize or fertility.

Providence is the principal of the iſlands. In the time of war much gain is made here by condemned prizes, and at all times by wrecks, which are frequent, from the many rocks and ſhelves. The Spaniſh galeons, in their paſſage to Europe, ſail between theſe iſlands and the coaſt of Florida.

Jamaica

*Jamaica** is ſuppoſed to contain upwards of 100,000 inhabitants, of which more than four-fifths are ſlaves. The iſland, in general, is very fertile; but ſugar, rum, and molaſſes are the moſt valuable articles of the Jamaica trade. Kingſton, the capital, is in the ſouth part of the iſland. At a little diſtance from Kingſton, is Spaniſh Town, or St. Jago de la Vega, where the courts of juſtice are held. Jamaica has been in poſſeſſion of the Engliſh from the year 1656, at which time it was taken from the Spaniards; St. Jago was then the capital; after this, Port Royal, which was deſtroyed by an earthquake in 1692, was the capital. Port Royal was built upon a barren, ſandy ſoil, but it formed the border of a fine deep harbour, capable of containing a thouſand ſail of large ſhips. It was rebuilt, and deſtroyed by an hurricane in 1722. In 1780, the ſea-port town of Savannah la Mer was almoſt deſtroyed by an hurricane. Jamaica is interſected with a ridge of rocks, which, however, are covered

* Jamaica, Cuba, Hiſpaniola, and Porto Rico, are called the Great Antilles; the Little Antilles are thoſe iſlands along the coaſt of Terra Firma. The weſternmoſt iſlands, called the Carribbean Iſlands, are divided into the Leeward Iſlands and Windward Iſlands; Martinico, and thoſe ſouth of it are the Windward-Iſlands.

with

with a great variety of beautiful trees; a vast number of rivulets of pure wholesome water issue from the rocks, and fall in cataracts.

Barbadoes contains nearly the same number of inhabitants as Jamaica, with a like proportion, or rather greater of slaves. The island, in general, is fertile, and its productions much the same with Jamaica, and most of the other West India islands. Bridgetown, the capital, is the residence of the Governor of the island. Barbadoes is the most easterly of all the Caribbees, but has generally been as much annoyed by hurricanes as any of them; it received great damage in 1780.

St. Christopher's, commonly called St. Kitt's, contains about 6000 whites, and 3600 slaves. This island, for its size, produces a great quantity of sugar.

Antigua contains about 7000 whites, and and 30,000 slaves; it has an excellent harbour, in which there is a dock-yard, and an establishment for the Royal Navy. The ordinary seat of the Governor of the Leeward Islands is at St. John, the port of the greatest trade.

Nevis and *Montserrat* contain each about 5000 whites, and 10,000 ſlaves.

Barbuda contains about 1500 inhabitants; it belongs to the Codrington family. It has no direct trade with England. The inhabitants are moſtly employed in huſbandry, and raiſing proviſion for the neighbouring iſlands.

Anguilla contains but few inhabitants; it is perfectly level, and its inhabitants apply themſelves much in huſbandry, and feeding cattle.

Dominica, from its ſituation with regard to Guadaloupe and Martinico, which it is between, and other political reaſons, has been declared to be a free port, and has its own peculiar government.

St. Vincent is, in general, very fruitful. Many of the inhabitants are Carribeans. When it was ceded to the Engliſh in 1763, many inhabitants of the adjacent iſlands came and ſettled here.

Granada and the *Grenadines* are fruitful; ſeveral bays (the principal of which is St. George's) and harbours, lay round Granada, and a lake on

on the top of a hill, in the middle of the iſland, ſupplies it plentifully with rivers. Theſe iſlands have hitherto eſcaped the ravages of the hurricanes.

Cuba, the largeſt of the Weſt India Iſlands, is fertile, but not well cultivated. A chain of hills runs through the middle of the iſland from eaſt to weſt, but the land near the ſea is in general level, and in the rainy ſeaſon a great deal of it is flooded. The principal towns in this iſland have good harbours, among which are St. Jago, facing Jamaica, which is ſtrongly ſituated and well fortified; the Havannah, (the capital of the iſland), facing Florida, likewiſe a place of great ſtrength and importance; and Santa Cruz, about 30 miles eaſt of the Havannah.

Hiſpaniola, or *St. Domingo*, is extremely fertile, eſpecially the north-weſt parts, which belong to the French. The iſland is diverſified with hills, valleys, woods, and rivers; cattle of the European kind run wild in the woods, and are ſo plenty as to be hunted for their hides and tallow only. The moſt ancient town built by the Europeans in the Weſt Indies, is St. Domingo,

mingo, which is the capital of the part of the island which belongs to Spain; it is situated on a spacious harbour, and is well built. The French towns are, Cape François, Leogane, Petit Guaves, and Port Louis.

Porto Rico is extremely fertile, and it is beautifully diversified with woods, plains, and rivers. The capital, Porto Rico, stands in a little island, on the north side of the main island; it encloses a capacious harbour, and is joined to the chief island by a causeway, defended with forts and batteries.

Virgin Islands are very small; they are situated at the east end of Porto Rico.

Trinidad is fertile, but unhealthy.

Margaretta is fertile, and abounds in verdant pasture.

Martinico is very fertile, and is diversified with hills and rivers; its bays and harbours are numerous, and strongly fortified. This island is the residence of the Governor of all the French West India islands.

Guadaloupe

Guadaloupe is very fertile, and is ſtrongly fortified. It is divided in two parts by a narrow channel, navigable only to ferry boats.

St. Lucia is very fertile in the valleys, and has ſome convenient harbours. This iſland, under certain reſtrictions, is declared by the French to be a free port.

Tobago is very fertile, and has many convenient bays and creeks; it has hitherto eſcaped the ravages of the hurricanes.

St. Bartholemew, Deſeada, and *Marigalante*; theſe iſlands are of inconſiderable conſequence, except in time of war, when they afford ſhelter to the French privateers.

St. Euſtatius is one continued mountain, almoſt round, and riſing gradually in a pyramidical form. It is in want of ſprings and rivers; but the Dutch have added to it all the poſſible advantages of art. It is ſuppoſed to contain about 5000 whites, and 15,000 ſlaves. Sugar and tobacco are the chief produce of the iſland. The inhabitants carry on a contraband trade with the Spaniſh iſlands, and in time of war have generally enriched themſelves by

their professed neutrality. The same may be said of the inhabitants of Curasou, which is a barren island, made, however, extremely valuable by Dutch management. It has a fine harbour, a neat built town, many handsome public buildings; and numerous warehouses, stored with European and Asiatic commodities. The island is made to produce tobacco and sugar, and it has good salt works.

St. Thomas and *St. Croix*, or *Santa Cruz*. These two Danish islands have improved much since the late King of Denmark bought up his West India Company's stock, and laid the trade open. Several persons from the English islands have settled here.

The islands off the coast of South America belonging to Spain, are the *Gallipago Islands*, situated on the western part of the continent, near and about the equator; *Chiloe*, near the western coast, between 41 and 43 degrees of south latitude, (it has a governor, and some well fortified harbours), and other very small islands.

Juan Fernandes is uninhabited, but it has some good harbours, and has been found convenient

venient to English cruizers, who have touched here to take in water. In this island Alexander Selkirk, a Scotchman, was left by a ship to which he belonged; after a long and lonely residence, a Capt. Rogers, who touched here, found him, and conveyed him home: his journal of adventures in the island he entrusted to one Defoe to get published, but Defoe defrauded him, by bringing out the adventures, on his own account, under the title of Robinson Crusoe.

A particular Description of the chief CITIES in the EUROPEAN KINGDOMS and STATES.

LONDON is the center of commerce, and the heart of the British nation; it communicates its treasures with the most distant parts of the world, and it is the seat of liberty and justice, and the encourager of arts and sciences. Its public buildings and commercial conveniences taken in *toto* are unequalled, and its river surpasses any other in the world, for the richness of its burthen: its banks likewise contain, besides the King's Dock-yards, for building men of war, three large wet docks, 32 dry docks, and 33 yards for building merchant ships. The City of

of Westminster and Borough of Southwark join their buildings with London. The whole contain two noble Cathedrals, 102 Parish Churches, upwards of 180 other places devoted to religious worship, 100 alms-houses, and 20 hospitals. The number of inhabitants are supposed to be a million; and taking in the extent of continued buildings, the circumference is more than 35 miles.

Edinburgh is remarkable for the extreme loftiness of its buildings, (which are all of stone); for the spaciousness of its High-street; for its Castle, which is the height of twenty stories, built upon a steep and lofty rock, inaccessible, except where it joins the City; Holyrood House, which faces the Castle, &c. &c. Parallel to the city on the north, a new town is building, the streets and squares of which are laid out with the utmost regularity, and the architecture does honour to the present age. Between the old and new town, lies a narrow vale; over the eastern part there is a bridge, the center arch of which is about 90 feet high; this renders the communication between the old and new Town short and convenient. On the south side of the vale, and on the western extremity, the Castle stands. What is sometimes called the harbour of Edinburgh is properly the harbour of Leith; it is about

about two miles diſtant from Edinburgh. The Supreme Courts of Juſtice for North Britain are held at Edinburgh.

Dublin ſtands about ſeven miles from the ſea, at the bottom of a large and ſpacious bay, (to which it gives name) upon the river Liffey, which divides it into two parts. It is banked through the whole length of the city on both ſides, forming noble and ſpacious quays. Below the firſt bridge veſſels load and unload before the merchants warehouſes. There is a ſtone wall built about three miles in length, about the breadth of a moderate ſtreet, and ſufficiently high, to confine the channel of the bay of Dublin, and to ſhelter veſſels in ſtormy weather. The Parliament Houſe, the New Exchange, the Barracks, Trinity College, the Linen Hall, &c. are well deſerving notice. The city of Dublin is an archbiſhopric.

Bergen is a principal ſea-port, and carries on a great fiſhing trade: ſeveral thouſand barrels of the roes of large fiſhes, caught on the Norway coaſt, are yearly exported to the coaſt of Britany, for the uſe of the pilchard fiſheries *.

* The roes are mixed with a ſufficient quantity of ſalt water, to make a paſte to anoint the nets with; the nets are then ſpread looſely on the ſurface of the water, and in their deſcent the pilchards are eager for the bait.

Copenhagen is remarkable for a fine harbour, formed by a large canal, which flows through the city: it can admit only one ſhip at a time, but it is capable of containing 500. Several of the ſtreets have canals and quays for ſhips to lay cloſe to the houſes. The Danes have a capital arſenal for the navy here. The road for the ſhipping begins about two miles from the town, and is defended by 90 pieces of cannon. Copenhagen itſelf is defended by four royal caſtles, or forts. The palace, which contains many grand apartments, is moated round with a triple ditch; but the fineſt palace is at Frederickſburgh, about twenty miles from Copenhagen.

Stockholm is a ſtaple * town. It ſtands upon ſix contiguous iſlands, in the Meller Lake, and is built upon piles. The town is furniſhed with all the exterior marks of magnificence which are common to the greateſt European cities, ſuch as erections for manufactures and commerce: it has likewiſe a national bank, the capital of which is £. 466,666 13s. 4d. ſterling. The

* Certain towns in Sweden, twenty-four in number, are called Staple Towns: in theſe towns the merchants are allowed to import and export commodities in their own ſhips. Thoſe towns which have no foreign commerce are called Land Towns, even if they are near the ſea.

caſtle

caſtle accommodates the royal court, and the national courts and colleges. The harbour of of Stockholm is difficult of acceſs, but it is convenient and ſpacious. Through Stockholm England is in part ſupplied with ſhip anchors.

Peterſburgh ſtands at the bottom of the Gulf of Finland. The river Neva, which communicates with the lake of Ladoga, divides it into two parts: towards the ſea it is defended by the fortreſs of Cronſtadt. The city is about ſix miles every way, and contains every ſtructure for national and public uſe, commerce, and magnificence, that are to be ſound in the moſt celebrated European cities *.

Warſaw is almoſt in the center of Poland, on the river Viſtula. It is the royal reſidence, and contains many magnificent palaces and other buildings. The city and its ſuburbs exhibit a ſtrong contraſt of wealth and poverty, and have but little commerce.

* In the year 1703, Peterſburgh conſiſted only of a few ſmall fiſhing huts; the ground was ſo wateriſh and ſwampy, that it was formed into nine iſlands.

Berlin,

Berlin, the present royal residence of Prussia, is situated on the river Spree, in the marquisate of Brandenburgh. It contains a royal palace, and some others; its streets and squares are spacious and regular. *Koningsberg*, on the river Pregel, (which is navigable), is sometimes accounted the capital of the kingdom. This city has palaces, a town-house, an exchange, a citadel, and a good harbour. There are seven bridges over the Pregel.

Vienna contains many palaces, among which are two imperial ones: it also contains an university, a bank, and a court of commerce. Its religious buildings, with the walks and gardens, occupy a sixth part of the town.

Prague is a large, fine, and magnificent city, and is famous for its noble bridge. It contains 92 churches and chapels, and 40 cloisters. It is situated on the river Mulda.

Amsterdam, next to London, is the greatest commercial city in the world: it contains every convenience for commerce, and its public works are grand and sublime. The city stands on the river Amstel, and an arm of the sea called Wye.

It

It is in size about half as big as London, and is built on piles of wood.

Brussels, or *Bruxelles*, is the residence of the viceroy of the Austrian Netherlands. It is a strong fortified town, and agreeably situated on the river Senne.

Paris is divided into three parts, the City, the University, and what was formerly called the Town. The City, or Old Paris, consists of three little islands, in the middle of the river Seine*; the Town, (the largest part), which is on the north side of the river; and the University, which is on the south side. The palaces † are showy, and some of its houses and public buildings are superbly decorated with paintings and statues. Among the public buildings the first are the Louvre, the Thuilleries, the Palace of Orleans, called Luxemburgh, the Guildhall, the Academy, and the Hospital for Invalids. The hotels of the French noblesse, which are walled in, take up a great deal of room, with their court-yards and gardens. Paris is of a circular form, and is nearly as large as London. It is supposed to contain about 750,000 inhabitants.

* The river Seine is not half so broad as the Thames at London, neither is it navigable for shipping.

† The palace of Versailles is about 12 miles from Paris.

Madrid is about ſeven miles in circumference, ſituated in the middle of a ſandy plain, ſurrounded with high mountains. It contains three royal palaces *, very ſpacious and magnificent. The principal one, called the Palace Royal, ſtands on an eminence, on the weſt ſide of the city. Some of the ſtreets of Madrid are ſpacious and handſome.

Gibraltar is ſituated on a rock, in 36° 5′ of north latitude, and in 5° 17′ of weſt longitude, and is acceſſible on the land only by a narrow paſſage between the rock and the ſea, walled and fortified both by nature and art. Acroſs this iſthmus the Spaniards have drawn a fortified line, to prevent the garriſon from being ſupplied from Spain. The harbour of Gibraltar is formed by a mole,

* The Eſcurial, which is the pride of Spain, is about twenty-one miles north-weſt of Madrid. Its buildings are in the form of a gridiron; the King's apartment in it forms the handle. This palace has ſeveral thouſand doors and windows, and every convenience and ornament that can make it elegant and ſuperb; it has alſo an extenſive park, with groves, fountains, caſcades, grottos, &c. Philip II. erected the building in commemoration of a victory obtained by him over the French, at St. Quintin's, on St. Lawrence's day, 1557; accordingly, it was dedicated to St. Lawrence, who is ſaid to have ſuffered martyrdom on a gridiron.

a mole, which is well fortified; but the road is neither safe against an enemy nor storms. The bay is about twenty leagues in circumference. The Straits are about twenty-four miles long, and fifteen broad, and have constantly a strong current setting from the Atlantic Ocean.

Lisbon is a great commercial city. It is situated on the north bank of the Tagus, about ten miles from its mouth, and about eighty from the western frontiers of Spain. The streets are spacious, and the houses are lofty and elegant. The whole town presents itself agreeably upon the rising banks of the river, in the form of a crescent. The harbour of Lisbon is spacious and secure, and the city is guarded by forts from any sudden attack from the sea.

Berne * is situated on the river Aar. This city, and the canton to which it belongs, makes the most considerable district of Switzerland. It is said to be able to fit out 100,000 armed men. The city is well provided with arsenals and public edifices.

* Basil is by some reckoned the capital of Switzerland.

Rome * is ſituated upon the river Tiber †. Its ſtreets are ſpacious, and magnificently built. Its churches are very numerous, and ſome of them in point of architecture, magnificence, and furniture, (eſpecially St. Peter's) equal, if not ſurpaſs, any in the world. The caſtle of St. Angelo is the chief fortreſs of Rome. As the preſent city ſtands on the ruins of ancient Rome, the ſeven hills, on which it was originally built, cannot be well diſtinguiſhed. The city contains within its circuit many vineyards and gardens.

Naples is ſituated within about four miles of the famous volcano, called Mount Veſuvius ‡. It

* Bologna is the next principal city to Rome in the Eccleſiaſtical State. Its inhabitants are a commercial people.

† The Tiber is much leſs conſiderable than the Thames, and is navigable only to ſmall craft. It has five bridges over it.

‡ Veſuvius, at the bottom, and on the north and eaſt declivity, is covered with vines and fruit trees; the top and ſouth and weſt ſides are covered with cinders and ſtones. The height of the ſummit above the ſurface of the ſea is about 3900 feet. Among the towns and cities which Veſuvius has deſtroyed are Herculaneum and Pompeia. The melted lava in its courſe filled up the ſtreets above the houſe-tops to the height of many feet. In the year

It is superbly adorned with a profusion of art and riches. Its street called Strada di Toledo, is said to exceed any in Rome for beauty and elegance.

Florence is situated on the river Arno, forty-five miles east of Leghorn. Next to Rome it is the most rich and beautiful city in Italy. The Grand Duke's palaces are eminently superb. The city stands between mountains, covered with vineyards and pleasant villas.

Genoa is situated on a rising strand, near the sea. Its houses are lofty and well built, and the principal street from one end to the other resembles a double row of palaces. The city is fortified with a double wall six miles in circuit. The harbour of Genoa is large and deep.

Venice is situated on a number of small islands, at about five miles from the continent. The

year 1736 artificers, employed by the King of Naples, dug deep enough to discover some of the principal buildings of Herculaneum, and even the bed of the river which ran through it. Pompeia has likewise been cleared to the pavement of the streets, and many skeletons have been found in the houses.

avenues

avenues to it are ſo difficult, that the Venetians have not thought it neceſſary to encompaſs it with a wall. By ſea it is too ſhallow for large ſhips to come near it. The city contains many fine palaces and lofty towers *.

Cagliari has been already mentioned with the Iſland of Sardinia.

Buda is ſituated on the ſide of a hill on the ſouth-weſt ſide of the river Danube; it is defended by a caſtle, and ſtrongly fortified; *Preſburgh*, reckoned by ſome the capital of Hungary, is a large fortified city on the north ſide of the Danube.

Conſtantinople † is ſituated on the weſtern ſhore of the Boſphorus; it is built in the form of a triangle. The city has nine gates, one of which is very magnificent; the Ottoman Palace occupies an amazing extent of ground; and

* Many other principal towns of the ſtates of Italy, beſides thoſe already mentioned, are remarkable on particular accounts; Mantua, for inſtance, for being ſtrongly fortified; Milan, for its fine gothic, and rich cathedral, &c.

† Adjoining to Conſtantinople are four towns, called Pera, Galata, Pacha, and Tophana. In Pera the foreign ambaſſadors and all ſtrangers reſide. They are not permitted to live in the city.

is

is inclosed with a wall 30 feet high, having towers and battlements; it occupies that angle which runs out between the Propontis, and the harbour, which is one of the best in Europe. Constantinople has many fine buildings, and is supposed to contain about 700,000 inhabitants.

Caffa, the most considerable town in the Crimea, is situated on the south-east part of the peninsula.

Athens is situated in a large plain near the river Ilissus, in the province of Livadia. It is about four miles in circumference.

NEW DISCOVERED ISLANDS.

*NEW HOLLAND** lies between 11 and 38 degrees of south latitude, and between 109 and 153 degrees of east longitude. Botany Bay is on the south-east part of the island, in about lat. 35 degrees.

* This country is much larger than any other that does not bear the name of a continent.

New Guinea lies between 2 and 12 degrees of ſouth latitude, and between 131 and 150 degrees of eaſt longitude.

New Britain *, *New Ireland*, *New Hanover*, the *Admiralty Iſlands*, and other ſmaller ones lie off the north-eaſt part of New Guinea.

New Hebrides are ſituated between 14° 29′ and 20° 4′ of ſouth latitude, and between 66° 41′ and 171° 21′ of eaſt longitude.

New Caledonia † is ſituated ſouth-weſt of the New Hebrides; it is about 250 miles in length, but its breadth ſeldom exceeds 30 miles.

New Zealand conſiſts of two large iſlands, divided by a ſtrait of about four or five leagues broad; they lie between 34 and 48 degrees of ſouth latitude, and between 166 and 183 degrees of eaſt longitude.

* New Britain and New Ireland are of conſiderable extent.

† A few leagues diſtant from New Caledonia, are two iſlands, one called Botany Iſland, and the other, the Iſland of Pines. New Caledonia and New Zealand are the two largeſt iſlands in this part of the ſouthern ocean.

The

The *Friendly Islands* are about twenty in number; they lie round lat. 21° south, and longitude 175 west; these islands are fertile and pleasant; the principal of them are, Annamooka, Tongataboo, and Eooa, Amsterdam, Rotterdam, and Middleburg.

Obeteroa is situated in lat. 22° 27′ south, and long. 150° 47″ west; it is about 13 miles in circumference.

Otaheite, or *King George's Island*, is situated between 17° 28′ and 17° 53′ of south latitude, and between 149° 11′ and 149° 39′ of west longitude; it consists of two peninsulas joined by an isthmus, and is surrounded by a reef of coral rocks, which form several excellent bays and harbours. The land rises in ridges, forming mountains, which may be seen at the distance of more than 100 miles.

The *Society Islands* are six in number; they lie about 100 miles north-west of Otaheite.

The *Sandwich Islands* are twelve in number; they are situated in the Pacifick Ocean, between 18° 53′ and 22° 15′ of north latitude, and 154° and 160° of west longitude. In the largest of these islands, named Owhyhee, the cele-

 brated

brated navigator, Capt. Cook, was killed by the natives.

Northern Archipelago consists of several groupes of islands, situated between the eastern coast of Kamschatka and the western coast of North America.

Besides the before mentioned islands, many others of less note have been discovered in the Pacifick and Southern Oceans, among which are, Queen Charlotte's Island, Prince William Henry's, Osnaburgh, Prince Edward's, Cumberland, Whitsun Island, &c.

Most of the islands treated of, especially New Holland, New Guinea, and other large ones, are very thinly inhabited, and, for want of cultivation, have nothing particular to recommend them. Their inhabitants are without learning or arts, and some of them are cannibals. Their complexions border on a chocolate colour.

CHAP.

CHAP. XXXIX.

Principal Mountains, Isthmuses, and Rivers.

MOUNTAINS.

ALPS, separate Italy from France and Germany.

Andes, or *Cordelleras*, extend from south to north through Chili.

Apalachian Mountains, westward of the American States.

Appenines, extend from south to north through Italy.

Atlas *, extend from the north-west part of Africa to Egypt.

Athos, (Greece), in Macedonia; it extends to the Egean Sea.

Balagate, (in India); they extend from north to south.

Carpathian, divide Hungary and Transylvania from Poland.

Caucasus, between Tartary and the Mogul Empire.

Cevennes, (France), in the province of Languedoc.

Daghistan, including Caucasus, Taurus, Ararat, &c. extend from the west of Asia through Persia to India.

Dolfrine, *Drorifield*, &c. between Norway and Sweden.

Grampian Hills, (Scotland), extend from near Aberdeen to Cowal, in Argyleshire

Jura, divides Franche Compté from Switzerland.

Lybian, between Egypt and Lybia.

Moon, (Mountains of), between Abyssinia and Monomotapa.

* The Mountains of Atlas are said to have given name to the Atlantick Ocean.

Olympus and *Pindus*, (Turkey in Europe), ſeparate Theſſaly from Epirus.

Parnaſſus, (Turkey, in Europe), in Lividia.

Pentland Hills, (Scotland), extend through Lothian, and join thoſe of Tweedale.

Pyrenees, divide France from Spain.

Vague, (France), divide Lorrain, from Burgundy and Alſace.

Zimnopoias, (called the Girdle of the Earth, thought to be the Montes Riphæi of the ancients), in the northern part of Ruſſia.

Isthmuses.

Corinth, joins the Morea to Greece.

Malacca, joins Malacca to the further India.

Panama, joins North and South America.

Suez, joins Africa to Aſia.

Rivers.

Argun and *Lena*, flow between the Ruſſian and Chineſe Empires.

Bog, flows through the province of Podolia and Budziac Tartary, and falls into the Black Sea between Oczacow and the mouth of the Neiper.

Danube, flows from the Black Foreſt in Swabia through Bavaria, Auſtria, Hungary, and Turkey in Europe, and falls by ſeveral ſtreams into the Black Sea.

Delaware, *St. Lawrence*, *Miſſiſſippi*, *Suſquehana*, *Patowmat*, *Oroonoko*, *Amazon*, *La Plata*, &c. were treated of with America.

Don, or *Tanais*, divides the ſouth-eaſt part of Ruſſia in Europe from Aſia.

Drave, flows from Saltzburgh in Germany, divides Hungary from Sclavonia, and falls into the Danube.

Two Dwina's, one gives name to the province of Dwina, in Ruſſia, and falls into the White Sea; the other flows from

from Lithuania, divides Livonia from Courland, and falls into the Baltic Sea near Riga.

Ebro, (the ancient Iberus), flows from Old Caſtile through Biſcay and Arragon; thence through Catalonia into the Mediterranean Sea.

Elbe *, flows from the confines of Siberia through Bohemia, Saxony, and Brandenburgh; it divides the Dutchy of Lunenburgh from that of Mecklenburgh; alſo the Dutchy of Bremen from Holſtein. It falls into the Britiſh Sea about ſeventy miles below Hamburgh.

Euphrates, flows from two ſources northward of the city of Erzerum through Armenia. It divides Syria from Diarbeck, runs through Eyraca, unites with the Tigris, paſſes by the city of Baſſora, and falls into the Perſian Gulf.

Ganges, flows from the mountains which divide India from Tartary; it paſſes through many provinces, receives many other rivers, and falls by various ſtreams (the moſt diſtant of which are 200 miles apart) into the Bay of Bengal.

Garonne †, flows from the Pyrenean Mountains by Thouloufe; it divides the provinces of Guienne and Gaſcony, paſſes thence near Bourdeaux, and falls into the Bay of Biſcay about 60 miles from Bourdeaux.

Indus, flows from the mountains which divide India from Tartary; it paſſes through many provinces, and falls into the Gulf of Scindi below Tata.

Kur, (anciently Cyrus), flows from the Mountains of Georgia into the Caſpian Sea.

Loire, flows from the Cevennes to the Bay of Biſcay.

Maes, flows from Burgundy through Lorrain and Champaigne, and thence paſſes through the Netherlands, and falls into the Britiſh Sea a little below Briel ‡.

* The Elbe is navigable for great ſhips further from its mouth than any other River in Europe.

† This river communicates with the Mediterranean, by means of a canal cut by Lewis the Fourteenth. The tide flows up the river to within about twenty miles above Bourdeaux.

‡ Briel, or Brill, is about twelve miles ſouth of the Hague, in a ſmall iſland, named Voorn.

Moselle, flows from the Mountains of Vague in Lorrain, through the Dutchy and Electorate of Triers, and falls into the Rhine.

Neiper, or *Boristenes*, flows from Russia, in Europe, through Poland into the Russian Ukraine; it separates Little Tartary from Budziac Tartary, and falls into the Black Sea near Oczakow.

Niester, divides Podolia in Poland from Moldavia in Turkey, also Bessarabia from Budziac Tartary; it falls into the Black Sea near Belgorod.

Niger, flows from Negroland into the Atlantick Ocean by three branches, Rio Grande, Gambia, and Senegal.

Nile, flows from Abyssinia through Egypt to the Levant Sea.

Oby, flows from Kalmuck Tartary to the Northern Ocean, and serves as one of the boundaries of Europe.

Oder, flows from the Carpathian Mountains through Silesia, (in which it gives name to a town); thence through Brandenburgh; then it forms the division between eastern and western Pomerania, divides into several channels, and falls into the Baltic Sea.

Oxus, flows from the northern mountains of India; separates Usbec Tartary from Persia, and falls into the Caspian Sea.

Po, flows from the Alps through Piedmont to the Gulf of Venice.

Rhine, flows from Switzerland, forms the Lake of Constance, whence it passes to Basil; divides Swabia from Alsace, thence it runs through the Palatinate *, and gives name to two of the circles of Germany, receives the Necker, Maine, and Moselle, passes by Mentz, &c. enters the Netherlands, divides into several channels, and falls into the British Sea,

Rhone, flows from the Alps through the Lake of Geneva, thence through the towns of Avignon and Arles, and falls into the Mediterranean Sea a little to the westward of Marseilles.

* The Palatinate contains the territories of the Elector Palatine; the above-mentioned is in the circles of the Lower Rhine; it extends on each side the river, and is about 100 miles long, and 70 broad; the other Palatinate is in the circle of Bavaria.

Sambre,

Sambre, flows from the confines of Piccardy, and falls into the Maese at Namur.

Save, flows from Corinthia, a Dutchy of Austria; it divides Sclavonia from Turkey, and falls into the Danube at Belgrade, in the province of Servia.

Scheld, flows from Picardy, runs north-east by Cambray, Valenciennes, Tournay, &c. receives the river Lis at Ghent; flows thence by Dendermond, then to Antwerp, below which it divides into two branches, one called the Western Scheld, which separates Flanders from Zealand, and falls into the sea near Flushing. The other branch, called the Oster Scheld, runs by Bergen op Zoom, and thence between the islands Beveland and Schowen, and falls into the British Sea.

Tagus, flows from the confines of Arragon through New Castile and Estremadura, thence through Portugal, and forms the harbour of Lisbon, at which city it is about three miles wide.

Tiber, flows from Tuscany, and falls into the Mediterranean Sea, about fifteen miles below Rome, which it passes through.

Tigris, flows from the mountains in Armenia, divides Diarbec from Curdistan, passes Bagdat, and falls into the Euphrates.

Vistula, flows from the mountains south of Silesia; it passes by Cracow and Warsaw, and falls into the Baltic Sea below Dantzic.

Weser, flows from the Landgravate of Hesse, thence between the circles of Westphalia and Lower Saxony, and falls into the British Ocean below Carlstat.

Wolga, flows from the north part of Russia, through Persia, Georgia, and Tartary, and falls into the Caspian Sea.

The Rivers in Great Britain, &c. and the Mountains in England and Wales, were mentioned in their respective Chapters.

A GEO-

A GEOGRAPHICAL TABLE,

Containing the Situations of

PRINCIPAL CITIES, TOWNS, CAPES, &c.

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Abbeville	Picardy	France	50 7 N.	1 54 E.
Aberdeen	Aberdeenshire	Scotland	57 22 N.	1 40 W.
Abo	Finland	Sweden	60 27 N.	22 18 E.
Acapulco	Mexico	North America	17 10 N.	101 20 W.
Achem	Sumatra	East India	5 22 N.	95 29 E.
Agincourt	Artois	Netherlands	50 35 N.	2 0 E.
Agra	Agra	East India	26 43 N.	76 49 E.
Air	Airshire	Scotland	55 30 N.	4 35 W.
Aix	Provence	France	43 31 N.	5 31 E.
Aix-la-Chapelle	Westphalia	Germany	50 45 N.	5 50 E.
Albany	New York	North America	42 48 N.	73 30 W.
Aleppo	Syria	Turkey in Asia	35 45 N.	37 25 E.
Alexandretta	Syria	Turkey in Asia	36 35 N.	36 25 E.
Alexandria	Lower Egypt	Africa	31 11 N.	30 21 E.
Algiers	Algiers	Barbary	36 49 N.	2 17 E.
Almanza	Murcia	Spain	39 0 N.	1 15 W.
Amboyna	I. Amboyna	East India	4 25 S.	127 25 E.
Amiens	Isle of France	France	49 53 N.	2 22 E.
Amsterdam	Holland	Netherlands	52 22 N.	4 49 E.
Annapolis	Maryland	North America	39 25 N.	78 0 W.
Annapolis	Nova Scotia	North America	45 0 N.	64 0 W.
Antigua	I. Antigua	Carib. Sea	17 4 N.	62 4 W.
Antioch	Syria	Turkey in Asia	36 30 N.	36 40 E.
Antwerp	Brabant	Netherlands	51 13 N.	4 27 E.
Archangel	Dwina	Russia	64 34 N.	38 59 W.
Astracan	Astracan	Russia in Asia	38 5 N.	23 57 E.
Athens	Achaia	Turkey in Europe	23 35 S.	43 13 E.
Augustine St.	East Florida	North America	29 45 N.	81 12 W.
Ava	Ava	East India	20 20 N.	95 30 E.
Avignon.	Provence	France	43 57 N.	4 53 E.
Bagdat	Eyraca	Turkey in Asia	33 20 N.	43 51 E.
Balasore	Orixa	East India	21 20 N.	86 5 E.
Balbec	Syria	Turkey in Asia	33 30 N.	37 0 E.
Barcelona	Catalonia	Spain	41 26 N.	2 18 E.
Basil	Basil	Switzerland	47 35 N.	7 34 E.
Bassora	Eyraca	Turkey in Asia	30 45 N.	47 0 E.
Bastia	I. Corsica	Mediterranean	42 20 N.	9 40 E.
Batavia	I. Java	East India	6 10 S.	106 56 E.
Bayeux	Normandy	France	49 16 N.	0 47 E.

Bayonne

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Bayonne	Gascony	France	43 30 N.	1 20 W.
Belfast	Ulster	Ireland	54 30 N.	6 30 W.
Bender	Bessarabia	Turkey in Eu.	46 40 N.	29 0 E.
Berlin	Brandenburgh	Germany	52 32 N.	13 31 E.
Bergen	Bergen	Norway	60 0 N.	6 0 E.
Bern	Bern	Switzerland	47 0 N.	7 20 E.
Bermudas	I. Bermuda	Atlantic Ocean	32 25 N.	63 23 W.
Belgrade	Servia	Turkey	45 0 N.	21 20 E.
Bencoolen	I. Sumatra	East India	3 49 S.	102 5 E.
Bourdeaux	Guienne	France	43 29 N.	1 25 W.
Boston	Massachuss. Col.	New England	42 25 N.	70 32 W.
Bologne	Picardy	France	50 43 N.	1 31 E.
Bologna	Bolognese	Italy	44 29 N.	11 26 E.
Bombay	I. Bombay	East India	18 56 N.	72 43 E.
Bilboa	Biscay	Spain	43 26 N.	3 18 W.
Bridgetown	I. Barbadoes	Atlantic Ocean	13 5 N.	58 3 W.
Breda	Brabant	Netherlands	51 40 N.	4 40 W.
Brest	Bretany	France	48 22 N.	4 25 W.
Bremen	Lower Saxony	Germany	53 25 N.	8 20 E.
Breslau	Silesia	Bohemia	51 3 N.	17 13 E.
Brussels	Brabant	Netherlands	50 51 N.	4 26 E.
Buenos Ayres	Paraguay	South America	34 35 S.	58 26 W.
Bruges	Flanders	Netherlands	51 16 N.	3 5 E.
Brunswick	Lower Saxony	Germany	52 30 N.	10 30 E.
Buda	Lower Hungary	Hungary	47 40 N.	19 20 E.
Burlington	Burlington	New Jersey	40 8 N.	75 0 W.
Bulac	Lower Egypt	Africa	30 0 N.	32 0 E.
Cadiz	Andalusia	Spain	36 31 N.	6 6 W.
Caen	Normandy	France	49 11 N.	0 16 W.
Cagliari	I. Sardinia	Italy	39 25 N.	9 38 E.
Cachao	Tonquin	East India	39 25 N.	105 0 E.
Cairo	Lower Egypt	Africa	30 2 N.	31 23 E.
Calais	Picardy	France	50 57 N.	1 55 E.
Callao	Peru	South America	12 1 N.	76 53 W.
Calcutta	Bengal	East India	22 34 N.	88 34 E.
Calmar	Smaland	Sweden	56 40 N.	16 26 E.
Cambray	Cambresis	Netherlands	50 10 N.	3 18 E.
Cambletown	Argyleshire	Scotland	55 30 N.	5 40 W.
Cambridge	Massachuss. Col.	New England	42 25 N.	71 5 W.
Candia	I. Candia	Mediter. Sea	35 18 N.	25 23 E.
Cambodia	Cambodia	East India	13 30 N.	105 0 E.
Canso (Port)	Nova Scotia	North America	45 20 N.	60 50 W.
Canton	Canton	China	23 7 N.	113 7 E.
Carlescroon	Schonen	Sweden	56 20 N.	15 31 E.
Carthage Ruins	Tunis	Barbary	36 30 N.	9 0 E.
Carthagena	Terra Firma	South America	10 26 N.	75 21 W.
Carthagena	Murcia	Spain	37 37 N.	1 3 W.
Candy	I. Ceylon	East India	7 54 N.	79 0 E.
Cassel	Upper Rhine	Germany	51 20 N.	9 20 E.
Cavan	Ulster	Ireland	54 51 N.	7 18 W.
Cayenne	I. Cayenne	South America	4 56 N.	52 10 W.
Challon	Burgundy	France	46 46 N.	4 56 E.

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Chandernagore	Bengal	East India	22 51 N.	88 34 E.
Chartres	Orleannois	France	48 26 N.	1 33 E.
Cherbourg	Normandy	France	49 38 N.	1 33 W.
Clermont	Auvergne	France	45 46 N.	3 10 E.
Colmar	Alsace	France	48 4 N.	7 27 E.
Cologne	Lower Rhine	Germany	50 55 N.	7 10 E.
Cape Clear	Munster	Ireland	51 18 N.	11 10 W.
—— Comorin	Madura	East India	7 56 N.	78 10 E.
—— Finisterre	Galicia	Spain	42 51 N.	9 12 W.
—— St. Vincent	Algarve	Portugal	37 2 N.	8 57 W.
—— of G. Hope	Caffraria	Africa	34 29 S.	18 28 E.
—— Florida	East Florida	North America	24 57 N.	80 30 W.
—— La Hogue	Normandy	France	49 45 N.	1 55 W.
—— Verd	Negroland	Africa	14 45 N.	17 28 W.
—— Ortegal	Gallicia	Spain	43 47 N.	7 34 W.
—— Horn	I. Terra del Fuego	South America	55 58 S.	67 21 W.
Ceuta	Fez	Morocco	35 4 N.	6 30 W.
Charles Town	South Carolina	North America	32 45 N.	79 12 W.
Charleroy	Namur	Netherlands	50 30 N.	4 20 E.
Copenhagen	I. Zealand	Denmark	55 40 N.	12 40 E.
Constantinople	Romania	Turkey	41 1 N.	28 58 E.
Cork	Munster	Ireland	51 53 N.	8 23 W.
Constance	Swabia	Germany	47 37 N.	9 12 E.
Corinth	Morea	Turkey	37 30 N.	23 0 E.
Cracow	Little Poland	Poland	50 10 N.	19 55 E.
Curassou	I. Curassou	West Indies	11 56 N.	68 20 W.
Cusco	Peru	South America	12 25 S.	70 0 W.
Damascus	Syria	Turkey	33 15 N.	37 20 E.
Dantzic	Polish Prussia	Poland	54 22 N.	18 38 E.
Damietta	Lower Egypt	Africa	31 0 N.	32 0 E.
Dacca	Bengal	East India	23 30 N.	89 20 E.
Delhi	Mogul Empire	East India	29 0 N.	76 30 E.
Delft	Holland	Netherlands	52 6 N.	4 5 E.
Derbent	Daghistan	Persia	41 41 N.	50 30 E.
Diarbeck	Diarbeck	Turkey in Asia	37 30 N.	42 0 E.
Dieppe	Normandy	France	49 55 N.	0 59 E.
Dijon	Burgundy	France	47 19 N.	4 57 E.
Derry	Ulster	Ireland	54 52 N.	7 40 W.
Dieu	Guzurat	East India	21 37 N.	69 30 E.
Dresden	Upper Saxony	Germany	51 0 N.	13 26 E.
Dublin	Leinster	Ireland	53 21 N.	6 1 W.
Domingo (St.)	I. Hispaniola	West Indies	18 20 N.	70 0 W.
Downs	British	Sea	51 25 N.	1 35 E.
Dunkirk	Flanders	Netherlands	51 2 N.	2 27 E.
Edinburgh	Edinburghshire	Scotland	56 0 N.	3 0 W.
Ephesus	Natolia	Turkey	38 1 N.	27 30 W.
Elbing	Royal Prussia	Prussia	54 15 N.	20 0 E.
Embden	Westphalia	Germany	53 25 N.	7 10 E.
Erzerum	Turcomania	Turkey in Asia	39 56 N.	42 5 E.
Fez	Fez	Morocco	33 30 N.	6 0 W.

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Fayal Town	Azores	Atlantic Ocean	38 32 N.	28 36 W.
Ferrara	Ferrarese	Italy	44 54 N.	11 41 E.
Florence	Tuscany	Italy	43 46 N.	11 7 E.
Flushing	Zealand	Holland	51 30 N.	3 25 E.
Flores	Azores	Atlantic Ocean	39 34 N.	30 51 W.
Francfort	Upper Rhine	Germany	50 4 N.	8 40 E.
Francfort	Upper Saxony	Germany	52 22 N.	15 0 E.
Funchal	I. Madeira	Atlantic Ocean	32 27 N.	17 1 W.
Fort St. David	CoromandelCoast	East India	12 5 N.	80 55 E.
Gallipoli	Naples	Italy	40 29 N.	19 0 E.
Gap	Dauphiné	France	44 33 N.	6 9 E.
Genes	Savoy	Italy	44 25 N.	8 40 E.
Geneva	Geneva	Switzerland	46 12 N.	6 5 E.
Genoa	Genoa	Italy	44 25 N.	8 30 E.
Gibraltar	Andalusia	Spain	36 5 N.	5 17 W.
Geo. Town (St.)	Bermudas	Atlantic Ocean	32 45 N.	63 30 W.
Geo. Fort (St.)	CoromandelCoast	East India	13 4 N.	80 33 E.
Ghent	Flanders	Netherlands	51 3 N.	3 48 E.
Goa	I. Goa	East India	15 31 N.	73 50 E.
Goree	Negroland	Africa	14 40 N.	17 20 E.
Gottenburg	Gothland	Sweden	57 42 N.	11 43 E.
Gottengen	Lower Saxony	Germany	51 31 N.	9 58 E.
Granville	Normandy	France	48 50 N.	1 32 W.
Gratiosa	Azores	Atlantic Ocean	39 2 N.	27 53 W.
Grats	Austria	Germany	47 4 N.	15 29 E.
Gravelines	French Flanders	Netherlands	50 59 N.	2 13 E.
Guam	Ladrone Island.	East India	14 9 N.	140 30 E.
Hague	Holland	Netherlands	52 4 N.	4 22 E.
Hamburgh	Holstein	Germany	53 34 N.	9 55 E.
Hallifax	Nova Scotia	North America	44 40 N.	63 15 W.
Hanover	Lower Saxony	Germany	52 32 N.	9 35 E.
Havannah	Island of Cuba	West Indies	23 11 N.	82 13 W.
Havre-de-grace	Normandy	France	49 29 N.	0 10 E.
James Town	Virginia	North America	37 30 N.	76 0 W.
Janeiro Rio	Brazil	South America	22 54 S.	42 38 W.
Jago (St.)	Chili	South America	34 0 S.	77 0 W.
Jago (St.)	Island of Cuba	West Indies	20 0 S.	76 30 W.
Jago (St.)	Cape Verd I.	Atlantic Ocean	15 0 N.	24 0 W.
Java Head	Island of Java	East India	6 49 S.	106 55 E.
Jeddo	Island of Japan	Pacific Ocean	36 20 N.	139 0 E.
Jerusalem	Syria	Turkey in Asia	31 55 N.	35 25 E.
Ingolstat	Bavaria	Germany	48 45 N.	11 30 E.
John's (St.)	Antigua	West Indies	17 4 N.	62 4 E.
John's (St.)	I. Newfoundland	North America	47 32 N.	52 21 W.
Joseph's (St.)	Mexico	North America	23 3 N.	109 37 W.
Ispahan	Irac Agem	Persia	32 25 N.	52 52 E.
Kinsale	Munster	Ireland	51 32 N.	8 20 W.
Kingston	I. Jamaica	West Indies	18 15 N.	76 38 W.
Kiou	Ukraine	Russia in Europe	50 30 N.	31 12 E.

Koningsberg

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Koningsberg	Ducal Prussia	Prussia	54 33 N.	21 31 E.
Lahor	Lahor	East India	32 40 N.	75 30 E.
Landau	Alsace	France	49 11 N.	8 2 E.
Landscroon	Schonen	Sweden	55 52 N.	12 51 E.
Lausanne	Bern	Switzerland	46 33 N.	6 31 E.
Leghorn	Tuscany	Italy	43 30 N.	11 0 E.
Leipsic	Upper Saxony	Germany	51 20 N.	12 40 E.
Leyden	Holland	Netherlands	52 10 N.	4 32 E.
Lima	Peru	South America	12 1 S.	76 44 W.
Liege	Westphalia	Germany	50 37 N.	5 40 E.
Limoges	Limousin	France	45 49 N.	1 20 E.
Lintz	Austria	Germany	48 16 N.	13 57 E.
Lisle	French Flanders	Netherlands	50 37 N.	3 9 E.
Lisbon	Estremadura	Portugal	38 42 N.	9 4 W.
Louisbourg	I. Cape Breton	North America	45 53 N.	59 48 W.
Loretto	Eccles. State	Italy	43 15 N.	14 15 E.
London	Middlesex	England	51 31 N.	1st Merid.
Louvain	Brabant	Netherlands	50 53 N.	4 49 E.
Lubec	Holstein	Germany	54 0 N.	11 40 E.
Lunden	Gothland	Sweden	55 41 N.	13 26 E.
Luneville	Lorrain	France	48 35 N.	6 35 E.
Luxemberg	Luxemberg	Netherlands	49 37 N.	6 26 E.
Lyons	Lyonois	France	45 45 N.	4 54 E.
Macao	Canton	China	22 12 N.	113 51 E.
Macassar	I. Celebes	East India	5 9 S.	119 53 E.
Madras	Coromandel Coast	East India	13 4 N.	80 33 E.
Madrid	New Castile	Spain	40 25 N.	3 20 E.
Mahon Port	I. Minorca	Mediter. Sea	39 50 N.	3 53 E.
Majorca	I. Majorca	Mediter. Sea	39 35 N.	2 34 E.
Malacca	Malacca	East India	2 12 N.	102 10 E.
Malines	Brabant	Netherlands	51 1 N.	4 33 E.
St. Maloes	Bretagne	France	48 38 N.	1 56 W.
Manilla	I. Luconia	Pacifick Ocean	14 36 N.	120 58 E.
Mantua	Mantua	Italy	45 20 N.	10 47 E.
Marseilles	Provence	France	43 17 N.	5 27 E.
Mecca	Arabia Felix	Arabia	21 45 N.	41 0 E.
Medina	Arabia Felix	Arabia	25 0 N.	39 33 E.
Mentz	Lower Rhine	Germany	50 0 N.	8 0 E.
Mequinez	Fez	Barbary	34 30 N.	6 0 W.
Messina	I. Sicily	Mediter. Sea	38 30 N.	15 40 E.
Mexico	Mexico	North America	19 54 N.	100 0 W.
Milford Haven	Pembrokeshire	Wales	51 45 N.	5 15 W.
Milan	Milan	Italy	45 25 N.	9 30 E.
Mocha	Arabia Felix	Arabia	13 40 N.	43 50 E.
Modena	Modena	Italy	44 34 N.	11 17 E.
Montreal	Canada	North America	45 35 N.	73 11 W.
Montpelier	Languedoc	France	43 36 N.	3 37 E.
Morocco	Morocco	Barbary	30 32 N.	6 11 W.
Moscow	Moscow	Russia in Europe	55 45 N.	37 50 E.
Munich	Bavaria	Germany	48 9 N.	11 35 E.
Munster	Westphalia	Germany	52 0 N.	7 10 E.

Narva

Names of Places.	*Provinces.*	*Kingdoms, &c.*	*Latitudes.* ° ′	*Longitudes.* ° ′
Narva	Livonia	Russia	59 0 N.	27 35 E.
Nanci	Lorrain	France	48 41 N.	6 16 E.
Nanking	Kiangan	China	32 0 N.	118 30 E.
Namur	Namur	Netherlands	50 28 N.	4 49 E.
Naples	Naples	Italy	40 50 N.	14 18 E.
Nantz	Bretagne	France	47 13 N.	1 28 W.
Nice	Piedmont	Italy	43 41 N.	7 22 E.
Newport	Rhode Island	North America	41 35 N.	71 6 W.
New-York	New York	North America	40 40 N.	74 0 W.
NicholasSt. Mole	I. Hispaniola	West Indies	19 49 N.	73 24 W.
North Cape	Wardhus	Lapland	71 10 N.	26 2 E.
Nuremberg	Franconia	Germany	49 27 N.	11 12 E.
Olmutz	Moravia	Bohemia	49 30 N.	16 45 E.
Olympia	Greece	Turkey in Eur.	37 30 N.	22 0 E.
Oporto	Duero	Portugal	41 10 N.	8 22 W.
Orleans	Orleannois	France	47 54 N.	1 59 E.
Orleans, New	Louisiana	North America	29 57 N.	89 53 W.
Ormus	I. Ormus	Persia	26 50 N.	57 0 E.
Oran	Algiers	Barbary	36 30 N.	0 5 E.
Osnaburg	Westphalia	Germany	52 31 N.	7 40 E.
Ostend	Flanders	Netherlands	51 13 N.	3 0 W.
Omers, St.	Flanders	Netherlands	50 44 N.	2 19 E.
L'Orient, (Port)	Bretagne	France	47 45 N.	5 20 W.
Padua	Paduan	Italy	45 25 N.	12 8 E.
Palermo	I. Sicily	Italy	45 22 N.	12 0 E.
Palmyra, (Ruins)	Syria	Turkey in Asia	33 0 N.	39 0 E.
Pampeluna	Navarre	Spain	43 15 N.	1 30 E.
Panama	Darien	Terra Firma	8 47 N.	80 6 W.
Paris	Isle of France	France	48 50 N.	2 25 E.
Parma	Parma	Italy	44 45 N.	10 51 E.
Patna	Bengal	East India	25 45 N.	83 0 E.
Pegu	Pegu	East India	17 0 N.	97 0 E.
Peking	Petchioli	China	39 54 N.	116 29 E.
Pensacola	West Florida	North America	30 22 N.	87 20 W.
Persepolis	Irac Agem	Persia	30 30 N.	54 0 E.
Petersburg	Ingria	Russia in Eur.	59 56 N.	30 24 E.
Philadelphia	Pennsylvania	North America	39 56 N.	75 9 W.
Pico	Azores	Atlantick Ocean	38 28 N.	28 21 W.
Pisa	Tuscany	Italy	43 43 N.	10 17 E.
Placentia	I. Newfoundland	North America	47 26 N.	55 0 W.
Poitiers	Poitou	France	46 40 N.	1 10 W.
Pondicherry	Coromandel Coast	East India	11 41 N.	79 57 E.
Porto Bello	Terra Firma	South America	9 33 N.	79 45 W.
Port Royal	I. Jamaica	West Indies	18 0 N.	76 40 W.
Prague	Bohemia Proper	Bohemia	50 4 N.	14 50 E.
Potosi	Peru	South America	21 0 S.	77 0 W.
Providence	New England	North America	41 50 N.	71 21 W.
Presburgh	Up. Hungary	Hungary	48 20 N.	17 30 W.
Quebec	Canada	North America	46 55 N.	69 48 W.
Quintin. St.	Picardy	France	49 50 N.	3 22 E.
Quito	Peru	South America	0 13 S.	77 50 W.

Ramillies

Names of Places.	*Provinces.*	*Kingdoms, &c.*	*Latitudes.* ° ′	*Longitudes.* ° ′
Ramillies	Brabant	Netherlands	50 46 N.	4 50 E.
Ragusa	Dalmatia	Turkey in Eur.	42 45 N.	18 25 E.
Ratisbon	Bavaria	Germany	48 56 N.	12 5 E.
Rennes	Bretagne	France	48 16 N.	1 36 W.
Rheims	Champagn e	France	49 14 N.	4 7 E.
Riga	Livonia	Russia in Eur.	56 55 N.	24 0 E.
Rochelle	Aunis	France	46 9 N.	1 4 W.
Rochfort	Saintonge	France	46 2 N.	0 33 W.
Rome	Ecclef. State	Italy	41 53 N.	12 34 E.
Rotterdam	Holland	Netherlands	51 56 N.	4 33 E.
Rouen	Normandy	France	49 26 N.	1 0 W.
Samarcand	Usbec Tartary	Asia	40 40 N.	69 0 E.
Santa Cruz	I. Teneriffe	Atlantick Ocean	28 27 N.	16 11 W.
Santa Fé	New Mexico	North America	36 0 N.	104 0 W.
Savannah	Georgia	North America	31 55 N.	80 20 W.
Sayd, or Thebes	Upper Egypt	Africa	27 0 N.	32 20 E.
Samaria, (Ruins)	Syria	Turkey in Asia	32 40 N.	38 0 E.
Senegal	Negroland	Africa	15 53 N.	16 26 W.
Siam	Siam	East India	14 18 N.	100 55 E.
Seville	Andalusia	Spain	37 15 N.	6 5 W.
Sidon	Syria	Turkey in Asia	33 33 N.	36 15 E.
Smyrna	Natolia	Turkey in Asia	38 20 N.	27 24 E.
Spa	Westphalia	Germany	50 30 N.	5 40 E.
Stralsund	Upper Saxony	Germany	54 23 N.	13 22 E.
Strasburgh	Alsace	France	48 34 N.	7 46 E.
Stockholm	Sweden Proper	Sweden	59 20 N.	18 8 E.
Spithead Road	English	Channel	50 48 N.	1 6 W.
Suez	Suez	Egypt	29 59 N.	33 27 E.
Surinam	Surinam	South America	6 0 N.	55 30 W.
Surat	Guzerat	East India	21 10 N.	72 27 E.
Syracuse	I. Sicily	Italy	36 58 N.	15 5 E.
Tanjour	Tanjour	East India	11 27 N.	79 7 E.
Tauris	Aderbeitzan	Persia	38 20 N.	46 30 E.
Teneriffe, (Peak)	I. Teneriffe	Atlantick Ocean	28 12 N.	16 24 W.
Tercera	Azores	Atlantick Ocean	38 45 N.	27 1 W.
Thorn	Regal Prussia	Poland	52 56 N.	19 0 W.
Teflis	Georgia	Asia	43 30 N.	47 0 E.
Tobolski	Siberia	Russia	58 12 N.	68 17 E.
Toulon	Provence	France	43 7 N.	6 1 E.
Toledo	New Castile	Spain	39 50 N.	3 25 W.
Trent	Austria	Germany	46 5 N.	11 2 E.
Troy, (Ruins)	Natolia	Turkey	39 30 N.	26 30 E.
Tornea	West Bothnia	Sweden	65 50 N.	24 17 E.
Tripoli	Tripoli	Barbary	32 53 N.	13 12 E.
Tripoli	Syria	Turkey in Asia	34 30 N.	36 15 E.
Tunis	Tunis	Barbary	36 47 N.	10 0 E.
Turin	Piedmont	Italy	45 5 N.	7 45 E.
Tyre	Syria	Turkey in Asia	32 32 N.	36 0 E.
Utrecht	Holland	Netherlands	52 7 N.	5 10 E.

Names of Places.	Provinces.	Kingdoms, &c.	Latitudes. ° ′	Longitudes. ° ′
Valenciennes	Hainault	Netherlands	52 22 N.	3 40 E.
Venice	Venice	Italy	45 26 N.	11 59 E.
Valencia	Estremadura	Spain	39 15 N.	7 30 W.
Vera Crus	Mexico	North America	19 12 N.	97 25 W.
Verona	Veronese	Italy	45 26 N.	11 23 E.
Versailles	I. of France	France	48 48 N.	2 12 E.
Vienna	Austria	Germany	48 12 N.	16 22 E.
Vigo	Gallicia	Spain	42 14 N.	8 23 W.
Wurtzburg	Franconia	Germany	49 46 N.	10 18 E.
Wardhus	Norwegian	Lapland	70 22 N.	31 11 E.
Warsaw	Massovia	Poland	52 14 N.	21 5 E.
Williamsburg	Virginia	North America	37 12 N.	76 48 W.
Worms	Lower Rhine	Germany	49 38 N.	8 5 E.
Wilna	Lithuania	Poland	54 41 N.	25 32 E.
Wittenburg	Upper Saxony	Germany	51 49 N.	12 46 E.
Wologda	Wologda	Russia	59 19 N.	41 50 E.
Zell	Saxony	Germany	52 52 N.	10 0 E.
Zurich	Zurich	Switzerland	47 52 N.	8 30 E.

THE

USE of the GLOBES.

TERRESTRIAL GLOBE.

PROB. I.

To find the Latitude and Longitude of any given Place upon the Globe.

TURN the globe on its axis till the given place is exactly under the figured edge of the brass meridian, then that degree of the meridian which is directly over the place is the latitude sought; and the degree upon the equator, which in this position is cut by the brass meridian, is the longitude sought. Madras will be found to be in about 13° of north latitude, and 80° 30′ of

of east longitude; and Kingston in Jamaica in about 18°¼ of north latitude, and 76° 38′ of west longitude.

PROB. II.

The Latitude and Longitude of a Place given to find its Situation on the Globe.

Find the given longitude on the equator, and bring it to the figured side of the brass meridian, then the situation of the given place will be found under the given degree of latitude on the brass meridian. If the latitude given be 19° 12′ north, and the longitude 97° 25′ west, the place in that situation will be found to be Vera Cruz, in Mexico.

PROB. III.

To find all Places that have the same Latitude as any given Place.

Find the latitude of the given place (by Prob. I.) then turn the globe on its axis, and all places which pass under the same degree of latitude on the meridian which the given place has, are the required places.

PROB.

PROB. IV.

To find all Places that have the same Longitude as any given Place.

Find the longitude of the given place (by Prob. I.) then all places which are under the same half of the brass meridian from north to south when the given place is under it, have the same longitude.

PROB. V.

To find the difference of Latitude between any two given Places.

Find the latitude of each place, then the number of intermediate degrees, &c. upon the brass meridian, contained between the two points which respectively answer to the latitude of the given places, will be the difference of latitude sought *.

The difference of latitude between London and Paris will be found to be about 2° 42′, and

* The same may be performed arithmetically, by adding the latitudes when one is north and the other south; and subtracting when both are north, or both south.

between Amsterdam and the Cape of Good Hope about 86° 51′.

PROB. VI.

To find the difference of Longitude between any two given Places.

Find the longitude of each place, then the number of the intermediate degrees, &c. upon the equator, contained between the two points which respectively answer to the longitude of the given places, will be the difference of longitude sought *.

The difference of longitude between Paris and Rome will be found to be about 10° 9′, and between Lisbon and Constantinople about 37° 2′.

PROB. VII.

The Time of the Day being given at any Place, to find the corresponding Time at any other Place.

Bring the place of which the time is given to the brass meridian, and set the index of the

* The same may be performed arithmetically, by adding the longitude when one is north and the other south, and substracting, when both are north, or both south.

hour

hour circle to the time given; then bring any other place to the brass meridian, and the hour index will point to its corresponding time.

When it is noon at London, it will be found to be near six o'clock in the evening at Calcutta, in the province of Bengal, and only a little past five in the morning at Kingston in Jamaica.

PROB. VIII.

To find the Antæci, Periæci, and Antipodes of any given Place.

1. Bring the given place to the brass meridian, then in the other hemisphere, under the same degree of latitude which the given place has, the situation of the Antæci will be found. 2. While the given place is under the brass meridian, set the hour index to the upper 12 *, (that next the north part of the horizon), and turn the globe till it point to the lower 12; then under the same degree of latitude which the given place has, and in the same hemisphere,

* Without moving the index to any particular hour, it would answer the same to turn the globe till the index passed over precisely 12 hours; but casual time is liable to be forgot, even while the globe is turning.

 the

the ſituation of the Periæci will be found. 3. The Antipodes (while the globe remains in the laſt poſition) will be found in the oppoſite hemiſphere to the given place, under the ſame degree of latitude.

With regard to the inhabitants of London, the Antæci will be found in the ſouthern ocean, about 17° ſouth-weſterly from the Cape of Good Hope: the Periæci will be found on the weſtern coaſt of North America, to the eaſtward of Kamſchatka: the Antipodes will be found in the ſouthern ocean, ſouth of the iſland of New Zealand.

PROB. IX.

To repreſent a parallel Sphere, a right Sphere, and an oblique Sphere.

1. Turn the meridian of the globe till the equator is in the plane of the horizon, the parallels will then coincide with the horizon as they do with the equator, thereby forming a parallel ſphere. 2. Turn the meridian till the poles are in the horizon, the parallels will then be at right angles to the horizon, thereby forming a right ſphere. 3. Let the globe be in any

ſituation

ſituation with regard to the horizon beſide the two laſt mentioned, the parallels will then be in an oblique ſituation, thereby forming an oblique ſphere.

PROB. X.

To find the Sun's Place in the Ecliptic, his Declination, and the Places to which he will be vertical on any given Day of the Month.

Look for the given day of the month on the horizon, and againſt it is the ſign and degree of the ecliptic which the ſun is in at that time *. Find the ſame ſign and degree on the ecliptic line on the globe, and bring it to the figured edge of the braſs meridian, the degree over it will be the ſun's declination for the given time, and all places which paſs under the ſame degree when the globe is turned on its axis, will have had the ſun vertical on the given day.

On May 21ſt it will be found that the ſun enters Gemini; that its declination is about 20° north; and that all parts of the earth which are in 20° of north latitude will have the ſun vertical in the courſe of the given day.

* When the ſun's place in the ecliptic is given to find the day of the month, it is evidently the converſe.

PROB.

PROB. XI.

A Place being given in the Torrid Zone, to find the two Days in the Year in which the Sun will be vertical to the same.

Bring the given place to the meridian, and note the degree, &c. of the meridian over it, then turn the globe on its axis, and observe the two points of the ecliptic line which pass under the degree, &c. noted; look upon the horizon for the two points of the ecliptic observed, and against them the two corresponding days respectively will be found.

The sun will be found to be vertical at Barbadoes on the 25th of April and 17th of August.

PROB. XII.

To rectify the Globe for the Latitude of any given Place; also for the Sun's Place on any given Day.

Turn the meridian till the north or south pole (according as the given latitude is north or south) be elevated as many degrees, &c. above the horizon as are equal to the latitude of the

given place, then bring the ſun's place for the given day to the meridian, and ſet the hour index to the upper 12, the globe will then be properly rectified for the latitude and the ſun's place; and if the quadrant of altitude be ſcrewed on the meridian, ſo that the ſide which is graduated into degrees, &c. be over the latitude of the given place, it will be rectified for the zenith, and properly adjuſted for working problems where diſtances, altitudes, &c. are ſought.

PROB. XIII.

To find the Diſtance between any two given Places on the Globe; alſo to find all thoſe Places that are at the ſame Diſtance from one of the given Places, as the two given Places are diſtant from each other.

Bring one of the given places to the meridian, and fix the quadrant of altitude over it; then direct its graduated edge to the other place *, and

* If the globe be rectified for the latitude of the place over which the quadrant of altitude is fixed, when the quadrant is directed over the other place, it will cut the horizon in the point of the compaſs which the ſecond place bears on from the firſt, viz. that under the meridian, and the degrees,

and note the degree, &c. over it, the intermediate degrees, &c. upon the quadrant, contained between the two places, is their diſtance aſunder: and (the globe remaining in the ſame ſituation) as the quadrant is moved round the globe from its preſent center of motion, all places which the degree, &c. on the quadrant before noted paſſes over muſt be at the ſame diſtance from one of the given places, viz. that which the quadrant is fixed over, as the two given places are diſtant from each other.

PROB. XIV.

To find what Number of Miles are equal to a Degree of Longitude in any given Latitude.

Lay the graduated edge of the quadrant of altitude, agreeable to the latitude, in a parallel ſituation to the equator, between any two meridians; note the intermediate degrees intercepted between the two meridians, and divide their diſtance aſunder, noted upon the quadrant by their diſtance aſunder upon the equator, and it

degrees, &c. contained on the horizon between the braſs meridian and the quadrant, is the meaſure of the angle of poſition formed by the meridians of both places.

will

will give the length of the degree of longitude sought.

For examples, see p. 19 of the Introduction.

PROB. XV.

To find the Meridian Altitude of the Sun, and its Zenith Distance on any given Day, and in any given Latitude less than 66° ½; also the Point of the Compass it rises on, and the Time of rising; and the Point of the Compass it sets on, and the Time of setting.

1. Rectify the globe for the latitude and sun's place, (by Prob. 11.) then the number of degrees, &c. contained upon the brass meridian, between the horizon and the sun's place, is its meridian altitude; and the number of degrees, &c. contained between the zenith (the point where the quadrant is fixed) and the sun's place, is the zenith distance. 2. Bring the sun's place to the eastern part of the horizon, and the point of the compass against it on the horizon is the point it rises on; the hour index at the same time points to the time of its rising. 3. Bring the sun's place to the western part of the horizon, and the point of the compass against

it

it on the horizon is the point it ſets on *; the hour index at the ſame time points to the time of its ſetting, and the hours, &c. paſſed over by the index of the hour circle between the time of riſing and ſetting is the length of the day.

On the 21ſt day of April the meridional altitude of the ſun at London will be about 50° 24′, and conſequently the zenith diſtance, or what the altitude wants of 90°, will be about 39° 36′. It will riſe near the E. N. E. point of the compaſs, and ſet near the W. N. W. point.

PROB. XVI.

To find the Length of the longeſt and ſhorteſt Day in any Latitude between the Equator and the Polar Circles.

Remark. The longeſt day in all northern latitudes is when the ſun is in the firſt degree of Cancer, and in all ſouthern latitudes † when the ſun is in the firſt degree of Capricorn.

* The time of ſun-ſetting doubled will give the length of the day, and the time of ſun-ſetting doubled will give the length of the night.

† If the given latitude be ſouth, the ſouth pole muſt be elevated.

Rectify

Rectify the globe for the given latitude, bring the first degree of Cancer to the eastern part of the horizon, and set the hour index to 12, then bring the same degree to the western part of the horizon, and the index will have passed over the time which answers to the length of the day in the given latitude. Repeat the like with the first degree of Capricorn, and both the longest and the shortest day will then be found. Either the remark or the time will determine the one from the other.

The longest day in London will be found to be about $16\frac{1}{2}$ hours, and the shortest about $7\frac{1}{2}$ hours; and the reverse will be the case at the same time to the antipodes of London.

PROB. XVII.

The Day of the Month and Time of the Day at any Place being given, to find where the Sun is vertical at that precise Time.

Find the sun's declination, then bring the given place to the meridian, and set the hour index to the precise time; turn the globe on its axis till the hour index point to the upper 12, and the place that is then under the same degree of

of the meridian which anſwered to the ſun's declination, has the ſun vertical.

On the 25th of April when it is 52 minutes after three o'clock in the afternoon at London, the ſun will be found vertical to the iſland of Barbadoes.

PROB. XVIII.

The Time of the Day being given at any Place, to find all thoſe Places to which the Sun is then riſing, ſetting, or culminating; where it is midnight, and where the twilight begins and ends; alſo the Height of the Sun above the horizon in any Part of the illumined hemiſphere, or its depreſſion beneath the horizon in any Part of the obſcure Hemiſphere.

Find where the ſun is vertical at the given time, (by Prob. 17.) bring the place found under the meridian, and turn the meridian till it is in the zenith, (i. e. rectify for the latitude of the place) then all thoſe places that are in the weſtern ſemicircle of the horizon have the ſun riſing, all thoſe places that are in the eaſtern ſemicircle of the horizon have the ſun ſetting; and all thoſe places that are under that part of the braſs meridian which is above the horizon have mid-day, thoſe places under the oppoſite part

part of the meridian have midnight *; and all thoſe places that are below the horizon, and within 18 degrees of it, have twilight; places beneath the horizon at a greater diſtance have dark night. All places which are above the horizon have the height of the ſun equal to their diſtances from the horizon of the place for which the globe is rectified, which horizon is now repreſented by the horizon of the globe; therefore if the quadrant of altitude be fixed on the zenith, its figured edge will ſhew the ſun's altitude to any place over which it is placed. Extend a piece of ſtring on the ſurface of the globe, from the horizon to any place in the obſcure hemiſphere, and the meaſure of the extent on the equator, or braſs meridian, will give the ſun's depreſſion beneath the horizon.

* The midnight may not be dark night, but twilight; alſo the noon and midnight in the frigid zones may either, or both, be light, dark, or twilight.

PROB. XIX.

The Day of the Month being given, to ſhew at one View the Length of the Day or Night in all Places where the Sun riſes and ſets within the Space of 24 *Hours.*

Rectify the globe for the latitude of the place to which the ſun is in the zenith on the given day, or, which is the ſame, rectify it for the ſun's declination, then the portions of the parallels of latitude which are above the horizon ſhew the lengths of the diurnal arches in their reſpective latitudes, and the remaining portions of the reſpective arches, the nocturnal arches. The portions of the ſeveral arches may be found by counting the hours contained between the two meridians, cutting any parallel of latitude in the eaſtern and weſtern parts of the horizon, or ſtill more exactly by means of the hour circle; for if a mark be made with a black lead pencil upon a parallel, or on any latitude between two parallels, (which may be done correctly by making the mark upon the globe under the meridian agreeable to the latitude), and the mark be brought to one ſide of the horizon, the hour index ſet to the upper twelve, and the place marked be then brought to

to the other ſide of the horizon, the index of the hour circle will have paſſed over the portion of time which agrees with the portion of the arch on which the mark was made, which will be the diurnal arch if the mark were moved above the horizon, and nocturnal if under. While the globe has the preſent rectification, if any particular place be brought to the meridian, the hour index ſet to twelve at noon, and the place brought to the eaſtern ſide of the horizon, the index will point to the time on which the ſun riſes at that particular place; and when brought to the weſtern ſide of the horizon, the index will point to the time on which it ſets at the ſame place.

PROB. XX.

To ſhew at one View the Lengths of the Days and Nights, at all Times of the Year in any Latitude.

Suppoſe firſt, The latitude given to be between the equator and the polar circles.

Rectify the globe for the given latitude, then the upper portions of circles paſſing through each degree of the ecliptic, will be the diurnal arches belonging each to its correſponding days of the year, and the remaining portions of the

 circles

circles will be the nocturnal arches. The lengths of the ſeveral arches may be found as in the laſt problem. If the globe be rectified for the latitude of London, the diurnal arch paſſing through the firſt degree of Cancer will be found to be about 16½ hours, and the diurnal arch paſſing through the firſt degree of Capricorn about 7½ hours; the nocturnal arches of the ſame two degrees muſt conſequently each be equal to its reſpective complement of 24 hours.

Suppoſe ſecondly, The latitude given to be 90°.

Rectify the globe for the given latitude, which will form a parallel ſphere, then half the parallels of declination will be above the horizon, and the other half below it, conſequently half the year muſt be day, and the other half night *.

Suppoſe thirdly, The latitude given to be between either polar circle and its reſpective pole.

Rectify the globe for the given latitude, then ſome of the parallels of declination in one he-

* The twilight muſt continue till the ſun has 18 degrees of declination in the obſcure hemiſphere; the time of dark night to the poles will therefore be only a few weeks in the year.

miſphere

misphere will be entirely above the horizon, the same number in the opposite hemisphere will be entirely beneath the horizon, and all other parallels will be divided by the horizon into diurnal and nocturnal arches; the number of entire circles above the horizon when doubled, will nearly * give the number of days in which the sun does not set in the given latitude, and the number of entire circles beneath the horizon when doubled, will nearly give the number of days in which the sun does not rise, and the points of the ecliptic which the intermediate circles pass through, shew the days in the year in which the sun rises and sets during the space of 24 hours, the diurnal and nocturnal arches of which may be measured as before directed. On the equator, as has before been shewn, the days and nights are always equal.

PROB. XXI.

A general Explanation of the Vicissitudes of Day and Night, the Alteration of the Seasons, &c. in all Places upon the Earth.

Let the globe be rectified, as in the last problem, for any place which has an equal lati-

* Its not answering exactly, is from the year's having 365 days, and the ecliptic but 360 degrees.

tude with the ſun's declination, and conceive the ſun at a great diſtance to be directly over that point of the meridian which anſwers to its declination, and which is, according to the preſent rectification of the globe, in the zenith of the horizon; then, as the globe is turned on its axis from weſt to eaſt, (repreſenting the true motion of the earth), the ſun muſt continually dart his direct or central rays on thoſe parts which ſucceſſively move under the degree of the meridian which anſwers to his declination, and his rays muſt fall obliquely on all other places which ſucceſſively come to the meridian, for they will have the ſun directly north or ſouth of them, juſt ſo many degrees as they are diſtant from the degree of the meridian which anſwers to the ſun's declination. As places recede from the meridian towards the eaſtern part of the horizon *, the ſun (conceived to be over the meridian), ſeems to recede more and more to the weſtward, till it is ninety degrees diſtant, at which time it is diſappearing. The latitude which is equal to the ſun's declination is on the eaſtern point of the horizon. The ſun to that and all other places, ſets in the direct oppoſite point of the horizon to that on which they reſpectively are. As the

* Continue to turn the globe ſlowly, ſo as to repreſent the different phænomena.

globe

globe is continued to be moved, the motion brings the ſame places nearer and nearer to midnight, till they arrive at the oppoſite part of the meridian to that on which the ſun made mid-day, which oppoſite part conſtitutes midnight; then the morning approaches, till the motion brings them to the weſtern part of the horizon, where the ſun is riſing in the oppoſite points of the horizon to thoſe on which they reſpectively are; then in their approach to the meridian, the time of noon comes nearer and nearer, till the motion of the globe brings them under it.

Let the globe now, (if its conſtruction will admit), be rectified for the equator, which will conſtitute a right ſphere, and ſuppoſe the ſun to be fixed over the zenith of the horizon of the globe, in whatſoever rectification it may have. The ſun in the preſent ſituation of the globe will enlighten half its ſurface from the north pole to the ſouth pole, (which two poles are now in the horizon), for the horizon divides all the parallels into two equal parts, making thereby twelve hours day and twelve hours night in every ſituation. Now, raiſe the north pole gradually till it is elevated $23\frac{1}{2}°$, which about anſwers to the ſun's greateſt declination north. As the globe is moving, obſerve how the diurnal

arches increaſe in the northern hemiſphere, and how they in like proportion decreaſe in the ſouthern hemiſphere. When the pole is elevated 23½°, the diurnal arches in the northern hemiſphere have their greateſt length, the diurnal arches in the ſouthern hemiſphere the leaſt, and the days in any latitude in one hemiſphere are equal in length to the nights in the ſame latitude in the other hemiſphere, thereby cauſing different ſeaſons. In this ſituation of the globe, the lower part of the parallel 66½° north reſts upon the horizon, and all the parallels in higher northern latitudes are entirely above the horizon. In the ſouthern hemiſphere, the upper part of the parallel 66½° ſouth but juſt touches the horizon, and all the parallels in higher ſouthern latitudes are entirely below the horizon. While the globe was moving from its firſt rectification to the laſt, continual day was gradually extending from the north pole to the polar circle. If the ſouth pole be gradually raiſed to 23½ degrees from the firſt rectification, exactly the converſe of the laſt caſe will preſent itſelf.

PROB.

PROB. XXII.

To find in what Latitude the longest Day is of any given Length less than 24 Hours.

Bring the first degree of Cancer to the meridian, and set the index to 12 at noon; turn the globe on its axis till the index has passed over half the given length of time, then stop the globe, and elevate or depress the pole till the first point of Cancer touches the horizon, and the horizon will at the same time cut the meridian in the degree of latitude sought.

If 15 hours be given for the longest day, the latitude will be found to be 41° 22′.

PROB. XXIII.

To find the Hour, &c. when the Morning Twilight begins and when the Evening Twilight ends in any Latitude, at a Time when the Sun rises and sets within 24 Hours, and the Midnight Depression is greater than 18 Degrees.*

1. Rectify the globe for the latitude and zenith; bring the sun's place to the meridian, and set

* While the midnight depression is less than 18 degrees, there can be no dark night. Places that have less latitude than

ſet the index to 12 at noon; then bring the ſun's place to the eaſtern part of the horizon, the degree of the ecliptic which at the ſame time is on the weſtern part of the horizon is diametrically oppoſite: direct the graduated edge of the quadrant of altitude to the point of the ecliptic on the weſtern part of the horizon, elevate the ſame point, and move the quadrant till the point is under the 18th degree, then the oppoſite point of the ecliptic, viz. that which anſwers to the ſun's place for the given time, will be 18 degrees below the horizon, and the index will point to the hour, &c. ſought for the beginning of twilight.

2. Rectify the globe as before, and bring the ſun's place to the weſtern part of the horizon, the degree of the ecliptic which at the ſame time is on the weſtern part of the horizon is the direct

than $48\frac{1}{2}$ degrees, have always dark night between the time of ſun-ſetting and ſun-riſing; but greater latitudes have dark night only at certain times of the year. The times of dark night between ſun-ſetting and ſun riſing from latitude $48\frac{1}{2}$ to the poles, are from 364 days to 76. At the north pole the dark night continues from the 13th of November to the 28th of January, and at the ſouth pole from May 12th to Auguſt the 1ſt; at all other times the poles have either continual twilight or continual day-light.

oppoſite

opposite point: direct the graduated edge of the quadrant of altitude to the point of the ecliptic on the western part of the horizon, elevate the same point, and move the quadrant till the point is under the 18th degree, then the opposite point, viz, that which answers to the sun's place for the given time, will be 18 degrees below the horizon, and the index will point to the hour, &c. sought for the ending of evening twilight, or the beginning of dark night.

On the 12th of May at London the morning twilight will be found to begin about ¾ past one o'clock, and the evening twilight to end about ¼ past ten o'clock.

PROB. XXIV.

To find the Time in which continual Twilight begins and ends in any given Latitude greater than 48½ Degrees.

Rectify the globe for the given latitude, and note the point of the meridian which is exactly 18 degrees beneath the part of the horizon next to the elevated pole, and as the globe is turned on its axis, observe the two points of the ecliptic which pass under the degree noted, the two

two days anſwering to the two points of the ecliptic will be the days ſought.

In London continual twilight will be found to begin about May 26th, and to end about July 18th.

PROB. XXV.

A Place being given in one of the Frigid Zones, to find what Number of Days (of 24 Hours each) the Sun continues above the Horizon of the ſame; alſo what Number of Days he continues beneath the Horizon of the ſame, and the firſt and laſt Days of his Appearance and Diſappearance.

1. Rectify the globe for the latitude of the given place; turn the globe on its axis, and obſerve the two points of the ecliptic which are equi-diſtant from the elevated tropical point, and which exactly touch the horizon in that part next the elevated pole, the days which anſwer to the two obſerved points are the firſt and laſt days of the ſun's continual appearance above the horizon of the given place, and conſequently bound the whole time of continuance. 2. Obſerve the two points of the ecliptic which are equi-diſtant from the depreſſed tropical point, and

and which are juſt below the horizon, in that part furtheſt from the elevated pole, the days which anſwer to the two obſerved points, are the firſt and laſt days of the ſun's continual appearance above the horizon of the given place, and conſequently bound the whole time of diſappearance.

In lat. 69° 48′ N. the ſun will be found to continue above the horizon from about the 22d of May to the 21ſt of July, and to diſappear from about the 21ſt of November to the 21ſt of January.

PROB. XXVI.

To find in what Latitude the longeſt Day is of any given Length leſs than half a Year.

Halve the number of days contained in the given time, and from the day of the month (on the horizon) which correſponds with the firſt degree Cancer, count, on either ſide, the half number of days; obſerve the point of the ecliptic which is againſt the extremity of the half diſtance in time; find the ſame point on the ecliptic line on the globe, and bring it to the meridian; then turn the meridian till the point is exactly in the horizon, and the elevation of the pole will ſhew the latitude.

If

If the given number of days be 61, the half number, 31½, reckoned from the 21ſt of June, which correſponds with the firſt degree of Cancer, will, according as the reckoning is made to the right or left, fall on the 22d of May, or the 21ſt of July: the two points of the ecliptic againſt which are reſpectively the firſt degree of Taurus and the firſt degree of Leo, either of theſe points being brought to the meridian, and the meridian turned till the point is exactly in the horizon, will leave the elevation of the pole above the horizon equal to the latitude ſought.

PROB. XXVII.

*The Day of the Month in the Spring or Autumnal Quarters * being given, to find thoſe Places where the Sun begins to continue above the Horizon more than 24 Hours without ſetting; and alſo thoſe Places where he begins to be totally abſent.*

Bring the ſun's place to the meridian, and obſerve the number of degrees contained betwixt it and the equator; then count the ſame number of degrees from the neareſt pole towards the equator, and note that point upon the meridian;

* By the Spring quarter, I mean from the 21ſt of March to the 21ſt of June; and by the Autumnal Quarter, from the 22d of September to the 21ſt of December.

then turn the globe on its axis, and all places which paſs under the point noted, are thoſe to which the ſun begins to continue above the horizon more than 24 hours without ſetting. All places which paſs under the ſame diſtance from the oppoſite pole towards the equator, will be thoſe where the ſun begins to be totally abſent.

CELESTIAL GLOBE.

A TABLE of the CONSTELLATIONS, exclusive of thoſe in the Zodiac, mentioned in Sect. 7, Parag. 41.

In the NORTHERN HEMISPHERE.

URSA Minor, Little Bear.
Urſa Major, Great Bear.
Draco, Dragon.
Cepheus.
Canes Venatici, *Aſteron & Chara*, Greyhounds.
Boötes.
Mons Menalus.
Coma Berenices, *Berenice's Hair*.
Cor Caroli, Charles's Heart.
Corona Borealis, the Northern Crown.
Hercules.
Cerberus.
Lyra, the Harp.
Cygnus, the Swan.
Vulpecula, the Fox.
Anſer, the Gooſe.
Lacerta, the Lizard.
Caſſiopeia.
Camelopardalus.
Serpens, the Serpent.
Ophiucus Serpentarius.
Scutum Sobieſki, Sobieſki's Shield.
Aquila, the Eagle.
Antinous.
Delphinus, the Dolphin.
Equulus, the Colt.
Pegaſus, the Flying Horſe.
Sagitta, the Arrow.
Andromeda.
Perſeus.
Auriga, the Waggoner.
Lynx.
Leo Minor, the Little Lion.
Triangulum Borealis, the Northern Triangle.
Muſca, the Fly.

In

In the SOUTHERN HEMISPHERE.

Cetus, or *Balenus*, the Whale.
Eridanus, the River Po.
Phœnix.
Toucan, the American Goose.
Orion.
Monoſcerus, the Unicorn.
Canis Minor, the little Dog.
Apus, the Bird of Paradiſe.
Hydra.
Sextans, the Sextant.
Crater, the Cup.
Corvus, the Raven.
Centaurus, the Centaur.
Lupus, the Wolf.
Ara, the Altar.
Triangulum Auſtralis, the Southern Triangle.
Pavo, the Peacock.
Corona Auſtralis, the Southern Crown.
Grus, the Crane.
Piſcis Auſtralis, the Southern Fiſh.
Lepus, the Hare.
Columba Noachi, Noah's Dove.
Robur Carolinum, the Royal Oak.
Crux, the Croſs.
Argo, the Ship.
Canis Major, the great Dog.
Apis, the Bee.
Hirundo, the Swallow.
Indus, the Indian.
Chamelion.
Piſcis Volans, Flying Fiſh.
Dorado, or *Xiphias*, the Sword Fiſh.
Hydrus, the Water Snake.

The Situation of ſome of the principal FIXED STARS.

	Mag.
Acharnar, in the ſource of Eridanus — —	1
Albiero, in the beak of Cygnus — — —	3
Alcair, in Aquila — — — — —	2
Aldebaran, or the Bull's Eye, in Taurus ——	1
Algenib, in the right ſide of Perſeus — —	2
Algol, Meduſa's Head, in Perſeus — —	2
Alioth, firſt in the tail of Urſa Major — —	2
Alpheta, in the Northern Crown —— ——	2
Arideſ, in Cygnus, near the tail — — —	2
Arato Baſ Aben, in the head of Draco — —	2
Arcturus, in the ſkirts of Boötes — — —	1
Aſſengue, in the north weſt corner of Lyra ——	2
Bellatrix, in Orion, left ſhoulder — —	2
Beltagueſe, in Orion, right ſhoulder — —	1
Benenaez, laſt in the tail of Urſa Major — —	2
Canopus, in the hull of Argo —— ——	1

Caſtor,

Mag.

Castor, in Gemini — — — 2

Capella, in the left shoulder of Auriga — — 1

Charles Wain, the seven remarkable stars of the second magnitude, in Ursa Major, four in the body, forming what is called the square, and three in the tail (two of which have been already mentioned). The two stars in the part of the square furthest from the tail are the pointers to the north pole. The southernmost star in the square is called Dubbe.

Cor Hydra, in Hydra — — — — 1

Cor Scorpionis, in Scorpio — — — — 1

Cor Leonis, in Leo Major — — — 1

Crossiers, four stars in the Cross, the northernmost and southernmost of which are the pointers to the south pole.

Deneb, in the tail of Leo Major — — 2

Enif, in the nose of Pegasus — — 3

Fomahaut, near the mouth of the Southern Fish — 1

Marhal, in the right wing of Pegasus — — 2

Mirach, in the girdle of Andromeda — — 2

Mencar, by the mouth of Cetus, — — 1

North Pole Star, in the extremity of the tail of Ursa Minor — — — — 2

Procyon, on the body of Canis Minor — — 1

Orion's Belt, contains three remarkable stars of the second magnitude.

Pes Centauri, near the right hoof of the Centaur — 1

Pleiades, seven remarkable stars in Taurus.

Pollux, in Gemini — — — — 2

Ras Algiethi, in the head of Hercules — — 3

Ras Alhagne, in the head of Serpentarius — — 2

Regel, in the left foot of Orion — — — 1

Scheat, in the right leg of Pegasus — — — 2

Schedar, in Cassiopeia — — — 3

			Mag.
Sirius, in the mouth of Canis Major	—	—	1
Spica, near the left leg of Virgo	—	—	1
Vindemiatrix, in the right wing of Virgo		—	3

Beſide the abovementioned ſtars, there are others of the firſt, ſecond, &c. magnitudes, denoted only by the letters in the Greek alphabet; as α, alpha; β, beta; γ, gamma; δ, delta; ε, epſilon, &c. The number of ſtars of the firſt magnitude are generally reckoned to be 20, of the ſecond magnitude 65, of the third magnitude 205, of the fourth magnitude 485, of the fifth magnitude 684, &c. The number of ſtars diſcoverable in either hemiſphere by the naked eye is not above a thouſand; their ſeeming innumerable at firſt ſight ariſes from our viewing them confuſedly, and without reducing them to any order.

PROB. I.

To find the Declination and right Aſcenſion of any fixed Star, alſo the Sun's right Aſcenſion for any given Time.

1. Bring the ſtar to the meridian, and the degree over it will be its declination, and the degree of the equinoctial which is at the ſame time cut by the meridian will be its right aſcenſion. 2. If the ſun's place for any given time be brought to the meridian, the degree of the equinoctial which is at the ſame

 time

time cut by the meridian, will be the ſun's right aſcenſion for the time given.

The declination of Aldebaran will be found to be about 16° north, and its right aſcenſion 65°; and the ſun's right aſcenſion on the 7th of June will be found to be 75°.

PROB. II.

The right Aſcenſion and Declination of any fixed Star given to find its Situation, alſo the Sun's right Aſcenſion and Declination given to find its Place in the Ecliptic.

1. Find the given degree of right aſcenſion on the equinoctial, and bring it to the meridian; then look under the degree of the meridian which anſwers to the given declination, and the ſtar's ſituation, or the ſun's, whichever was ſought, will be found.

If the right aſcenſion of a fixed ſtar be $98\frac{1}{4}°$ and its declination be $16\frac{1}{3}°$ ſouth, Syrius will be found to be the ſtar ſought; and if the right aſcenſion of the ſun be $302\frac{1}{2}°$, and its declination 20° ſouth, it will be found to be in the firſt degree of Aquarius.

PROB. III.

To find the Latitude and Longitude of a fixed Star.

Bring the firſt degree of Cancer to the north point of the horizon, Capricorn will then be in the ſouth point, Aries in the eaſt point, and Libra in the weſt point, the pole of the ecliptic will be under the meridian and in the zenith of the horizon, which, in the preſent ſituation coincides with the ecliptic. Fix the quadrant of altitude over the pole of the ecliptic, and bring its graduated edge over any ſtar of which the latitude and longitude is ſought; the degree of the quadrant over the ſtar will be its latitude, and the diſtance of the degree of the ecliptic, which is cut by it at the ſame time, from Aries, will be its longitude. The latitude of Arcturus will be found to be 31° north, and the longitude 200 degrees.

If the latitude and longitude of a fixed ſtar be given to find its ſituation, it will evidently be the converſe of the foregoing ſolution.

PROB.

PROB. IV.

To find the Amplitudes, the obliqne Aſcenſion, and the oblique Deſcenſion of any fixed Star in any given Latitude; alſo the Sun's Amplitudes, oblique Aſcenſion, and oblique Deſcenſion, for a given Time in any given Latitude.

1. Rectify the globe for the given latitude, then bring any ſtar to the eaſtern part of the horizon, and againſt the ſtar upon the horizon its amplitude ortive, and point of the compaſs on which it riſes will be found, the horizon will at the ſame time croſs the equinoctial in the degree of oblique aſcenſion; bring any ſtar to the weſtern part of the horizon, and againſt the ſtar its amplitude occaſive, and point of the compaſs on which it ſets will be found, the horizon will at the ſame time croſs the equinoctial in the degree of oblique deſcenſion.

2. Rectify for the given latitude, then bring the ſun's place to the eaſtern and weſtern parts of the horizon, and its amplitudes, &c. will be found in the ſame manner as thoſe of a fixed ſtar are found. In latitude 51½, the amplitude of

Syrius will be found to be about 28° foutherly, the oblique afcenfion 121, and oblique defcenfion 75. The amplitude of the fun in the fame latitude on the 21ft of May will be found to be about 24 degrees northerly, the oblique afcenfion 20, and the oblique defcenfion 58.

By means of the afcenfional differences, (the difference between the right and oblique afcenfion), the femi-arches of the fun's or of a ftar's revolution above and beneath the horizon, may be obtained as follows. When the latitude and declination are both north or both fouth, reduce the áfcenfional difference into time, (by reckoning after the rate of 15° to one hour), and add it to fix o'clock, it will then give the femi-arch of revolution above the horizon; the complement of which to twelve hours will be the femi-arch of revolution beneath the horizon. When the latitude and declination are one north and one fouth, reduce the afcenfional difference into time, and fubtract it from fix o'clock, it will then give the femi-arch of revolution above the horizon. The femi-arch of revolution above or beneath the horizon when doubled, will refpectively give the time of the object's continuance above or beneath the horizon.

PROB.

PROB. V.

The Latitude, Day of the Month, and Time of the Day being given to find the azimuth of the Sun or any Star when above the Horizon; also to find the Times on which any Star rises, culminates, and sets in any given Latitude on any given Day.*

1. Rectify the globe for the latitude, the sun's place, and the zenith, and turn it on its axis till the index points to the given time of the day; then bring the edge of the quadrant of altitude over the place of the sun or star, and it will cut the horizon in the azimuth sought †.

2. With the globe rectified for the latitude and sun's place, bring any star to the eastern side of

* The sun's or star's azimuth when beneath the horizon, may be found by extending a piece of thread from the zenith over the sun's or star's place to the nadir, for the thread will then cross the horizon against the azimuth. The length of thread which extends from the horizon to the sun's or star's place, will, if measured on the quadrant of altitude, shew the depression beneath the horizon.

† In the torrid zone, when the declination of the sun exceeds the latitude of the place, the sun will be on the same azimuth circle twice in the morning and twice in the afternoon.

the horizon, and the index will point to its time of rising; bring it to the meridian, and the index will point to its time of culminating; bring it to the western part of the horizon, and the index will point to its time of setting.

PROB. VI.

To find at what Time of the Year a given Star will be upon the Meridian at a given Hour of the Night.

Bring the ſtar to the meridian, and ſet the index to the given hour, then turn the globe on its axis till the index points to twelve at noon, the ſun's place in the ecliptic will then be under the meridian, and its correſponding day will be the time ſought.

PROB. VII.

To ſhew at one View the preſent Situation of the fixed Stars, alſo the ſucceſſive Times on which different Stars will riſe, culminate, and ſet, together with many other uſeful and entertain-Phænomena.

Rectify the globe for the latitude in, bring the ſun's place for the preſent day to the meridian, ſet

ſet the index to twelve at noon, and turn the globe on its axis till the index points to the preſent hour, &c. then all thoſe ſtars that are in the eaſtern part of the horizon are riſing, thoſe on the weſtern part are ſetting, and thoſe under the meridian are culminating. If the globe be now turned ſlowly on its axis from eaſt to weſt, the index will ſucceſſively point out the times on which different ſtars riſe, culminate, and ſet *. The time of riſing ſubtracted from the time of ſetting, leaves the time of a ſtar's continuance above the horizon; which continuance above the horizon ſubtracted from twenty-four hours, leaves the time of its continuance below the horizon. Thoſe ſtars which are not more diſtant from the elevated pole than the latitude in, are conſtantly above the horizon; and thoſe ſtars which are not more diſtant from the depreſſed pole than the latitude in is from the elevated pole, are conſtantly beneath the horizon.

Let the heavens be now conſidered, as they appear when viewed from different ſituations of the earth's ſurface, 1ſt. From the equator, 2dly, from the north or ſouth pole, and 3dly, from any latitude between the equator and the poles. Suppoſe London,

* The time ſhewn will not be ſtrictly true. See the note in p. 256.

1ſt. On

1st. On the equator half the heavens from north to ſouth preſents itſelf to view, celeſtial objects in the equinoctial riſe due eaſt and ſet due weſt; their aſcent and deſcent is perpendicular to the horizon, and the whole equinoctial circle in the heavens is in the plane of the equator, that is, if that ſpace which lies evenly and directly from the earth's center to the equator were infinitely extended in the ſame place, it would paſs through all objects in the equinoctial. Celeſtial objects north and ſouth of the equinoctial reſpectively riſe and ſet ſo much from the eaſt and weſt points of the compaſs towards the north or ſouth points, as is equal to their declinations, their aſcent and deſcent is parallel to the equinoctial, and the ſemicircle of their revolutions appears to diminiſh to the north and ſouth points of the horizon, where and whence the motion of the heavens appears to be generated as from an axis.

2dly. At either pole the ſame half of the heavens, from the zenith, or correſponding celeſtial pole, to the equinoctial, preſents itſelf to view. Celeſtial objects in the equinoctial appear to revolve in the horizon; and thoſe between the equinoctial and the zenith in their revolutions deſcribe parallels to the equinoctial, and have their heights

heights equal to their reſpective declinations. The fixed ſtars neither riſe nor ſet; the ſun is above the horizon one half of the year, and beneath it the other half; and the moon is above the horizon one half of the month, and beneath it the other half.

3dly. At London half the heavens from the north point of the horizon, extending $38\frac{1}{2}°$ beyond the apparently quieſcent pole, to the ſouth point of the horizon, extending $38\frac{1}{2}°$ beyond the equinoctial, preſents itſelf to view. Celeſtial objects in the equinoctial riſe due eaſt, and ſet due weſt; which is likewiſe the caſe in all places on the earth where they appear to riſe and ſet. Thoſe ſtars which are not more diſtant than $38\frac{1}{2}°$ (the complement of $51\frac{1}{2}$,) from the north pole of the heavens, are conſtantly above the horizon; and thoſe ſtars which are not more diſtant than $38\frac{1}{2}°$ from the ſouth pole of the heavens, are conſtantly beneath the horizon. All celeſtial objects which riſe and ſet, and have north declination, riſe and ſet to the northward of the eaſt and weſt points of the horizon, and continue more than 12 hours above it; and all celeſtial objects which riſe and ſet, and have ſouth declination, riſe and ſet to the ſouthward of the eaſt and weſt points of the horizon,

rizon, and do not continue ſo long as 12 hours above it *.

Remark. After ſun-ſet ſome celeſtial objects appear riſing, ſome on the meridian, and ſome ſetting; ſome, which were ſeen to ſet, appear to riſe again before the ſun riſes; while others, which, when firſt ſeen, appeared above the eaſtern part of the horizon, have not attained the weſtern part when the riſing ſun eclipſes their light.

PROB. VIII.

How to gain a Knowledge of the viſible fixed Stars by means of the Globe.

Rectify the globe, ſo as to ſhew the preſent ſituation of the fixed ſtars, and by means of a compaſs †, or meridian line ‡, place the globe in ſuch

* The motion of the moon in its orbit retards the revolution it would apparently have were it at reſt, therefore when near the equinoctial it is an exception to the laſt caſe.

† The variation of the compaſs (which in London is now about two points weſterly) muſt be attended to; that is, the needle muſt be made to point ſo much to the eaſtward of the north point of the card as the variation is weſtward, and *vice verſa* where the variation is eaſterly.

‡ In the temperate zones the edge of the ſhadow of any thing ſtraight, and placed perpendicular to the horizon when

ſuch a manner as that the brazen meridian may be in the plane of the terreſtrial meridian, the principal

when it is exactly twelve o'clock by the ſun, will be a meridian line. But for greater exactitude, I adviſe the following method from Ferguſon's Aſtronomy: "Make four or five concentric circles, about a quarter of an inch from one another, on a flat board about a foot in breadth; and let the outmoſt circle be but little leſs than the board will contain. Fix a pin perpendicularly in the center, and of ſuch a length that its whole ſhadow may fall within the innermoſt circle for at leaſt four hours in the middle of the day. The pin ought to be about the eighth part of an inch thick, and to have a round blunt point. The board being ſet exactly level in a place where the ſun ſhines, ſuppoſe from eight in the morning till four in the afternoon, about which hours the end of the ſhadow ſhould fall without all the circles: watch the times in the forenoon when the extremity of the ſhortening ſhadow juſt touches the ſeveral circles, and there make marks; then, in the afternoon of the ſame day, watch the lengthening ſhadow, and where its end touches the ſeveral circles, in going over them make marks alſo. Laſtly, with a pair of compaſſes find exactly the middle point between the two marks on any circle, and draw a ſtraight line from the center to that point, which line will be covered at noon by the ſhadow of a ſmall upright wire, which ſhould be put in the place of the pin. The reaſon for drawing ſeveral circles is, that in caſe one part of the day ſhould prove clear and the other part ſomewhat cloudy, if you miſs the time when the point of the ſhadow ſhould touch one circle, you may perhaps catch it in touching another. The beſt time for drawing a ameridian line in this manner is about the ſummer

principal ſtars in the heavens will then lie nearly in a direct line from the center of the globe through the correſponding ſtars on its ſurface, therefore a ſtraight wire placed perpendicularly on any ſtar on the globe's ſurface, will nearly point to the ſtar in the heavens which it repreſents.

The learner would do well firſt to obſerve ſome particular ſtars, ſuch for inſtance as the pole ſtar, which the pole of the globe in the preſent adjuſtment will nearly point to; the two other ſtars, ſomewhat leſs bright, which are almoſt in a right line with it; and four more, which form a ſort of quadrangle: theſe ſeven ſtars are the conſtellation Urſa Minor, the pole ſtar being in the tip of the tail. Not far from this conſtellation are the ſeven bright ſtars in Urſa Major, called Charles's Wain, forming

ſummer ſolſtice, becauſe the ſun changes his declination ſloweſt and his altitude faſteſt in the longeſt days.

"If the caſement of a window on which the ſun ſhines at noon be quite upright, you may draw a line along the edge of its ſhadow on the floor, when the ſhadow of the pin is exactly on the meridian line of the board; and as the motion of the ſhadow of the caſement will be much more ſenſible on the floor than that of the ſhadow of the pin on the board, you may know to a few ſeconds when it touches the meridian line on the floor."

nearly

nearly the ſame figure as thoſe in Urſa Minor. The two foremoſt in the ſquare, called the Pointers, lie almoſt in a right line with the pole ſtar.

By obſerving the ſtraight lines, triangles, quadrangles, &c. with the ſeveral directions which the principal ſtars have with regard to each other, the conſtellations to which they belong may be ſoon found. In this manner may the ſtars on the horizon, meridian, or almacanters, be traced in every part of the viſible hemiſphere.

Of the Correſpondence of the Terreſtrial and Celeſtial Spheres.

It has already been obſerved, that the equinoctial is a correſpondent to the equator, and the celeſtial poles to the terreſtrial poles; that the declination of celeſtial objects means their diſtance from the equinoctial, and that the latitude of a place means its diſtance from the equator; that the celeſtial ſphere inveſts or ſurrounds the terreſtrial ſphere; that all circles are ſuppoſed to be divided into 360 equal parts, called degrees; that from the equinoctial to either celeſtial pole are 90 degrees, and that from the equator to either terreſtrial pole are likewiſe 90 degrees; therefore

therefore when the declination of a ſtar is equal to the latitude of a place, ſuch ſtar within the ſpace of 24 hours * will have paſſed vertically over ſuch place; and all others that have the ſame latitude, in the ſame manner as has already been ſhewn of the ſun. Every ſtar, therefore, may be called a correſpondent to the places over which it paſſes. The ſtar, for inſtance, marked γ in the head of Draco, having 51° 32′ north declination, is a correſpondent to London and the following places, which it ſucceſſively paſſes over. From the meridian of London it paſſes over Middleſex, Berkſhire, Wiltſhire, the ſouthern part of Glouceſterſhire, croſs the Severn, the Briſtol Channel; thence ſouth of St. George's Channel, then over the counties of Cork and Kerry in Ireland, croſs the north part of the Atlantic Ocean, over the ſtraits of Belleiſle, croſs New Britain, the north point of the province of Canada; thence on to the ſouthern part of James's Bay; thence over New South Wales and unknown part of America, to the northern Archipelago in the Pacific Ocean; thence croſs the ſouthern part of Kamſchatka, the iſland of Sagalin, in the ſea of Kamſchatka; thence over

* A ſtar takes about 23 hours 56 minutes from the time of being on any meridian to the time of its being on the ſame again.

different

different Tartarean nations in Siberia; thence over sundry provinces of Russia in Europe; thence over Poland, Silesia, Upper Saxony, Upper Rhine, Westphalia, Flanders, the southern part of the United Provinces, and the southern part of the British Ocean, to the meridian of London again. When the said star or any other is on the meridian of London, or on any other meridian, all other stars, according to declination, right ascension, and difference of right ascension *, (which answer to terrestrial latitude, terrestrial longitude, and difference of terrestrial longitude) will at the same time be on such meridians, and vertical to such places as correspond in latitude, longitude, and difference of longitude, with the

* As right ascension is reckoned quite round the celestial sphere, viz. to 360 degrees, make therefore terrestrial longitude correspond with it by reckoning quite round the terrestrial sphere, viz. by adding west longitude to 180 degrees, then the agreement between the right ascension of any star, and the longitude of the meridian it is on at any time, will be the foundation whereby to find the meridian which any other star is on at the same time; for the difference of right ascension between the two stars will answer to the difference of longitude between the two meridians, which will at the same time have the two stars on their respective meridians. If the second star be eastward of the first, the meridian of the second place will be eastward of the first place, and *vice versa*.

declination, right aſcenſion, and difference of right aſcenſion of the reſpective ſtars. Therefore from the ſtars we may pronounce the diſtance and bearing of many remote provinces from our own zenith, at the ſame inſtant of time, in the ſame manner as we before determined the place to which the ſun was vertical at any propoſed time, and thus gain much geographical knowledge from the celeſtial ſphere.

PROB. IX.

To find the Time of the Year in which a Star riſes or ſets coſmically or achronically to any given Place.

1. Rectify the globe for the latitude of the given place, bring the ſtar to the eaſtern edge of the horizon, and obſerve what degree of the ecliptic riſes with it, the correſponding day to which is the time on which the ſtar riſes coſmically; bring the ſtar to the weſtern edge of the horizon, and the time anſwering to the degree of the ecliptic which at the ſame time is on the eaſtern edge of the horizon, is the time on which the ſtar ſets coſmically.

2. The time anſwering to the degree of the ecliptic which ſets with the ſtar, is the time on which

which it ſets achronically; and the time anſwering to the degree of the ecliptic which is cut by the weſtern edge of the horizon, when the ſtar riſes, is the time on which it riſes achronically.

PROB. X.

To find the Time of the Year on which a Star riſes and ſets heliacally.

Rectify the globe for the latitude of the place, bring the ſtar to the eaſtern edge of the horizon, fix the quadrant of altitude on the zenith, and apply its graduated edge to the weſtern ſide in ſuch manner that its 12th degree above the horizon may cut the ecliptic, the point of the ecliptic which is oppoſite to this will be 12 degrees below the eaſtern ſide of the horizon, and is the ſun's place in the ecliptic at the time a ſtar of the firſt magnitude * riſes heliacally. Bring the ſtar to the weſtern ſide of the horizon, and fix the quadrant of altitude over the 12th degree of the ecliptic on the eaſtern ſide of the horizon, the oppoſite point to which is the degree of the ecliptic on which a ſtar of the firſt magnitude ſets heliacally.

* Stars of different magnitude, according to inferiority of claſs and brightneſs, are at greater diſtances from the ſun in their heliacal riſing or ſetting.

PROB. XI.

To find the Hour of the Night by obſerving a Star to be on the Meridian.

Rectify the globe for the latitude in, and the ſun's place, and bring the given ſtar to the meridian, then the index will point to the time ſought.

PROB. XII.

The Day of the Month, and the Azimuth of any known Star being given, to find the Hour of the Night.

Rectify the globe for the latitude and the ſun's place. If the given ſtar be due north or ſouth, bring it to the meridian, and the index will ſhew the hour of the night; but if the ſtar be in any other direction, fix the quadrant of altitude in the zenith, and ſet it to the point of the horizon which anſwers to the ſtar's azimuth; then turn the globe on its axis till the ſtar is under the edge of the quadrant, and the index will point to the hour ſought.

PROB.

PROB. XIII.

Two Stars, either on the ſame Azimuth, or having equal Altitude, given, to find the Hour of the Night.

Rectify the globe for the latitude in, the zenith, and the ſun's place.

1. When the two ſtars are on the ſame azimuth, turn the globe and the quadrant, till both ſtars coincide with the edge of the quadrant, and the index will point to the hour ſought. The quadrant will, at the ſame time, cut the horizon in the azimuth.

2. When two ſtars have equal altitude, turn the globe till both ſtars coincide with the ſame degree of the quadrant, and the index will point to the hour ſought. The degree of the quadrant which the ſtars paſs under will, at the ſame time, ſhew the altitude.

PROB. XIV.

To find the Hour of the Night by the Altitude of any known Star.

Rectify the globe for the latitude in, the ſun's place, and the zenith; then turn the globe and quadrant, till the ſtar is under the given degree of altitude, and the index will point to the time ſought.

PROB. XV.

Two Stars given, one on the Meridian, and the other on the Eaſtern or Weſtern Part of the Horizon, to find the Latitude of the Place.

Bring the ſtar which was obſerved to be on the meridian to the meridian of the globe, then turn the meridian till the other ſtar is on the given part of the horizon, and the elevation of the pole will ſhew the latitude of the place.

PROB. XVI.

The Declination and Meridian Altitude of the Sun, or of any Star, given to find the Latitude of the Place.

Note the point of the braſs meridian which agrees with the given declination, then move the meridian till the point noted is as high above the horizon as the given altitude, and the elevation of the pole will ſhew the latitude of the place.

AN

APPENDIX

TO THE USE OF THE

GLOBES,

Containing sundry other Uses to which they may be applied.

IF either globe be placed horizontally in the sun's rays, and the pole be so directed toward the sun that the axis cast no shadow, the elevation of the pole will shew the latitude of the place.

If either globe be placed horizontally with the meridian due north and south in the sun's rays, and the globe be rectified for the latitude in, the hour circle of the globe will be a true equinoctial sun-dial, and the axis of the globe, (if it extend far enough), will be the gnomon; or, if when the globe has this rectification, and is furthermore rectified for the sun's place, a needle be placed perpendicularly over the sun's place on the ecliptic line, and the globe be turned till the needle cast no shadow, which will be

be when it is made to point directly to the ſun, the index will at the ſame time point to the time of the day.

If the globe be placed horizontally in the ſun's rays, the pole brought into the zenith, and the horizon turned till the ſhadow of the axis cut as many hours, &c. as are equal to the ſun's azimuth for the time being, (allowing 15° to an hour), the meridian of the globe will then be in the meridian of the place.

If the place of any planet be found by an ephemeris, and a mark made on the zodiac agreeable to its latitude and longitude, the time of the planets riſing, culminating, ſetting, &c. may be found by rectifying the globe for the latitude, ſun's place, and zenith, and bringing the planet to the horizon, meridian, &c. and obſerving the times pointed at by the index.

If the place of Venus for any given time be found in an ephemeris, and marked upon the zodiac, by obſerving whether ſhe riſes before the ſun, or ſets after him, it may be ſeen whether ſhe then be a morning or evening ſtar.

If

If when a lunar eclipſe begins * the point of the terreſtrial globe which is diametrically oppoſite to the ſun's place be brought to the meridian, places then above the horizon of the globe will be thoſe in which the beginning of the eclipſe will be viſible; and if the index be ſet to twelve o'clock, and the globe turned on its axis from weſt to eaſt, as the time proceeds, the places which ſucceſſively gain or loſe ſight of the eclipſe may be ſeen, and thoſe places determined where the whole duration of the eclipſe may be obſerved.

If at the time when an eclipſe of one of the ſatellites of Jupiter is to happen, the point of the ecliptic which is diametrically oppoſite to the ſun's place be brought to the meridian of both globes, the quadrants of altitude fixed on the zenith, the place of Jupiter, be found by an ephemeris, and marked on the celeſtial globe, according to its latitude and longitude at that time, and the quadrant be brought over the place of Jupiter, and its azimuth and altitude

* From the ſhort duration of ſolar eclipſes, and the latitude which the moon has when not in her nodes, it cannot by the globe be determined with any certainty at what places, (except thoſe to which the ſun is at that time vertical), the ſame will be viſible.

noted,

noted, and the correſponding point of the terreſtrial globe found, by placing its quadrant to the ſame azimuth, and making a mark under the noted degree of altitude, then the mark will be upon the place to which Jupiter at that time is vertical, and all places above the horizon of the globe, which are not more than 90 degrees from the mark, have the eclipſe viſible.

The phænomena * of the harveſt moon, which happen about the time of the Autumnal equinox, may be ſhewn by finding its latitude and longitude in an ephemeris, marking its places on the zodiac of the globe for two or three evenings before and after full, and exhibiting its times of riſing by rectifying for the ſun's place, and bringing its place to the eaſtern part of the horizon. The full moon at this time of the year is aſcending from the ſouthern to the northern ſigns, which increaſes the riſing amplitudes conſiderably.

If the hour and minute of high water at any place be obſerved at the time of new or full moon, and the globe be rectified for the latitude, the ſun's place, and the zenith, and the moon's latitude and longitude be found in an

* Theſe are in ſome meaſure variable, according to the place of the nodes.

ephemeris, its place marked on the zodiac of the globe, and the globe turned on its axis till the index point to the hour and minute of high water, then by directing the edge of the quadrant over the moon's place in the zodiac, the horizon will be cut by it in the point of the compaſs and azimuth which the moon is on at that time; and if the moon's place be marked in the zodiac of the globe for any other time, and the quadrant of altitude be fixed to the azimuth found, and the moon's place be brought to the edge of the quadrant, the index will point to the time of high water at the ſame place on the day which the moon's place was marked for.

By means of the equator, braſs meridian, and quadrant of altitude, a ſolution of ſpherical triangles may be obtained, the degrees on either will either ſerve for the ſides of the triangle, or to meaſure the quantity of the angle to which they are oppoſite. See the Introduction, paragraph 49.

Of the Peculiarities of certain Globes.

The Equator, beſides the uſual purpoſes, ſerves as an hour circle, and has the hours and minutes marked under it; over its plane on each ſide of the braſs meridian, is fixed a wire ſemicircle,

circle, carrying two sliding indexes, one on each side the meridian. When one of them is set to any time of the day, and the globe is turned on its axis, the hours pass under the index, thereby causing it to point out the time with the same exactness as if the index passed over the hours. The meridian of London is made to pass through the first point of Aries, which point is assigned for twelve o'clock at noon, the graduated side of the brass meridian, therefore, serves as an index when the globe is rectified for London, or any place on the same meridian. The hours on the terrestrial globe are numbered from west to east agreeable to the earth's motion *, and the hours on the equinoctial of the celestial globe from east to west, agreeable to the apparent motion of the heavens.

A thin, brass semicircle, or moveable meridian, graduated like the fixed brass meridian, is made to revolve round the body of each globe; on each of these moveable meridians is a thin circle, moveable from pole to pole, that on the terrestrial globe is about two inches in

* When particular problems, which relate to time, are given, the globe must be turned differently from the terrestrial globe on the usual construction, viz. from west to east.

diameter,

diameter, and is divided into a few points of the compaſs, for the purpoſe of repreſenting a terreſtrial or viſible horizon; that on the celeſtial globe is about half an inch in diameter, and is for the purpoſe of repreſenting the ſun when fixed over its place in the ecliptic. A ſilk thread is fixed on the celeſtial globe in the ſame manner as the moveable meridian, and has a little braſs ſemi-circle for the purpoſe of repreſenting the moon when fixed over its place in the zodiac.

On the fixed braſs meridian of the terreſtrial globe, and on each ſide of the north pole, to the diſtance of about $23\frac{1}{2}$ degrees, the days of the month are laid down according to the ſun's declination, therefore, if any day of the month on it be brought to the horizon, the other ſide of the meridian will be cut in the correſponding degree of declination.

Some rhomb lines are drawn on the terreſtrial globe, likewiſe parallels to the equator, through the degrees of the ecliptic, for the more readily finding the ſun's declination.

On the celeſtial globe there are Arabian characters fixed in the zodiac, to denote the places which

which the Arabian aſtronomers had obſerved the moon to be in or near on each day of her monthly courſe; they called them the manſions of the moon.

Each globe has a braſs wire circle, fixed below the horizon at the diſtance of 18 degrees, the limits of twilight.

Each globe is ſupported by a pillar and claws, with a magnetic needle in a compaſs box.

ASTRONOMY.

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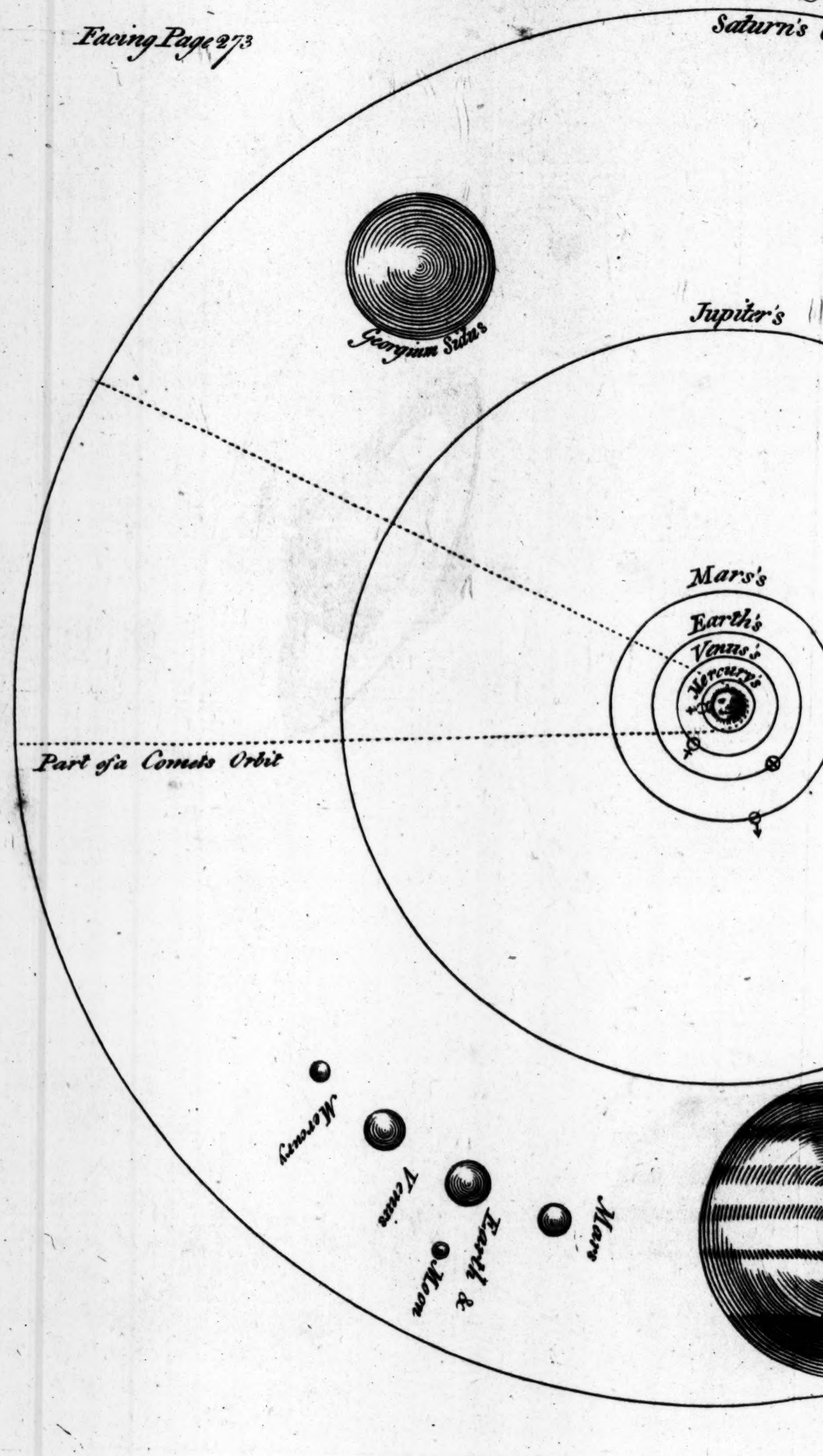
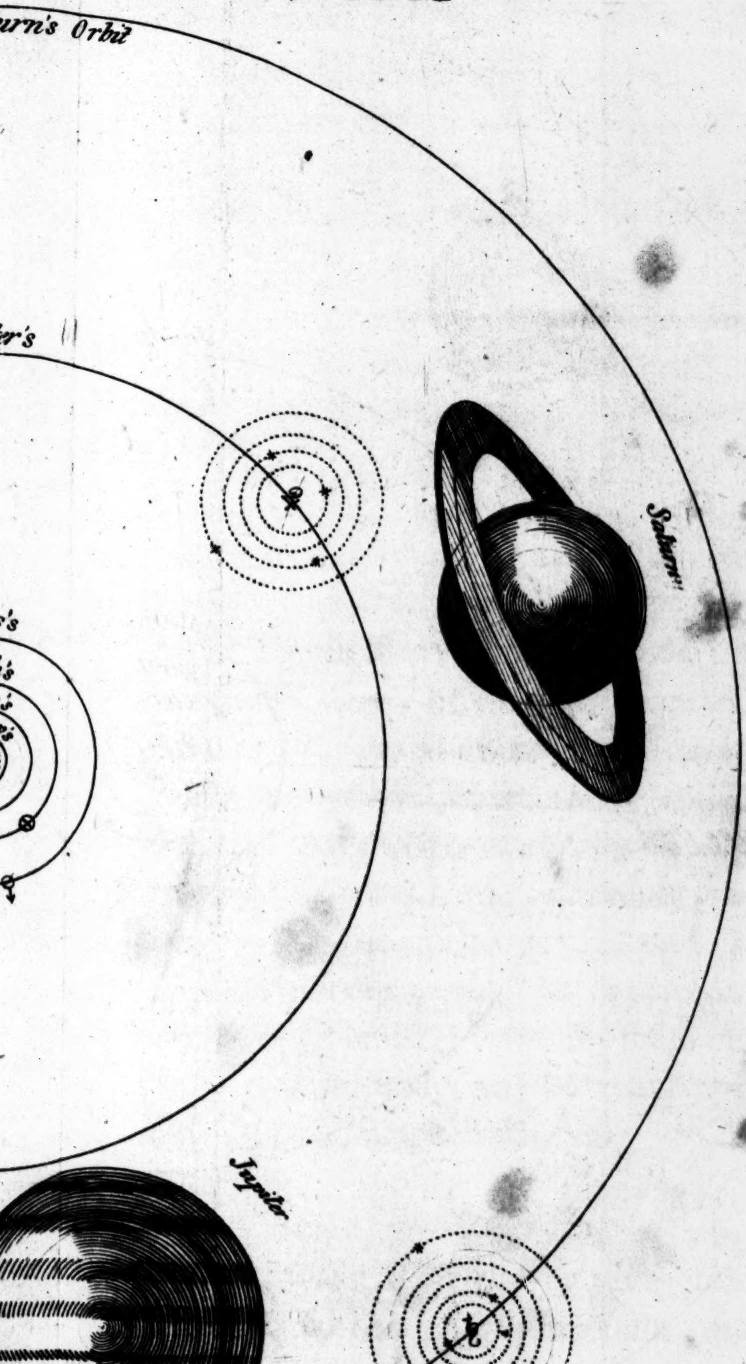


SOLAR SYSTEM



ASTRONOMY.

Of certain Phænomena of the Sun, the Planets, Comets, and the Fixed Stars.

Of the Sun.

74. It enlightens the world, and by its presence constitutes day; it is also the primary source of heat, and the grand operator in the animal, vegetable, and mineral kingdoms. Its distance is so great, that many thousands of miles make no apparent difference in its magnitude, although the place which Providence has allotted it makes it appear from our earth under so small an angle (its diameter subtending but little more or less than 32°) that its body may be eclipsed by a little object placed near the eye.

75. About the beginning of the sixteenth century, Galileo, by the help of glasses, discovered many spots on the sun's disk, often to the number of 40 or 50; however, the number of visible spots do not generally amount to 30, and

are commonly many leſs; there have even been times in which none could be diſcerned. The ſame ſpots are often to be ſeen for two or three months together; the nucleus, or central part, is much darker than the reſt; and when the ſpots diſappear, they are generally converted into luminous ſpaces, which appear much brighter than the other parts of the diſk. The ſpots appear to move acroſs the different parts of the diſk in ſuch ſlant directions with regard to the center, as determine the ſun's axis to have an inclined poſition to the plane of the ecliptic in an angle of about eight degrees. The ſpots appear to move quicker when near the central regions, than when near the edge of the diſk, which proves the ſun to be ſpherical; and each ſpot completes its revolution in about 25¼ days, which proves the ſun to revolve on its axis in the ſame time.

The ſun has ſeven primary planets revolving about him, viz. Mercury, Venus, the Earth, Mars, Jupiter, Saturn, and the Georgium Sidus.

Of Mercury.

76. This planet is nearer to the ſun than any other. Its greateſt diſtance is never ſo much as 56 times the ſun's diameter, it not having a

greater angular diſtance, or, which is the ſame, a greater elongation *, than 28 degrees. From this vicinity to the ſun, Mercury can never be ſeen ſo much as two hours either before the ſun riſes or after it ſets.

77. Mercury and all the planets move round the ſun from weſt, by ſouth, to eaſt, in orbits nearly circular, and but little inclined to each other.

78. The inclination of the orbit of Mercury to the plane of the ecliptic is 6° 54′; that is, Mercury never appears more than 6° 54′ either on the north ſide or on the ſouth ſide of the ecliptic.

79. Mercury and all the planets croſs the ecliptic twice in each revolution; in one half of the revolution they are on the north ſide of the ecliptic, and in the other half on the ſouth ſide.

80. When a planet appears in the ecliptic, it is ſaid to be in one of its nodes.

81. The nodes of the ſeveral planets are in different parts of the ecliptic. That node from

* A planet has no elongation when in conjunction with the ſun; in oppoſition it has 180 degrees.

which a planet continues on the north ſide of the ecliptic is called the aſcending node; the other, which is directly oppoſite thereto, is called the deſcending node.

Mercury's aſcending node is now in about 14° 43′ of Taurus *.

82. Mercury has an inferior and a ſuperior conjunction with the ſun. In the inferior conjunction he is between the earth and the ſun; and in the ſuperior conjunction the ſun is between the earth and him. When Mercury is in, or very near its node at the time of the inferior conjunction, he appears like a black ſpot paſſing over the ſun's diſk; and when he is in, or very near his node at the time of the ſuperior conjunction, he is entirely eclipſed behind the body of the ſun.

83. Mercury finiſhes his revolution about the ſun in nearly 88 days. His appearance in general is leſs than that of the other planets; his

* The line of the nodes of all the planets (i. e. a line if ſuppoſed to paſs from the place of one node through the ſun's center to the other node) conſtantly changes its place, and ſhifts its ſituation *in antecedentia*, or from eaſt to weſt, contrary to the order of the ſigns.

disk, however, is bright, and, when viewed through a good telescope, he appears to have all the phases which the moon has, except that of appearing with a full face.

84. From what has been advanced (the result of observation) it is evident that Mercury includes the sun within his orbit, and that he does not include the earth, for he has a superior and an inferior conjunction, but is never in opposition, that is, he is never 180 degrees from the sun, and consequently does not include the earth within his orbit.

85. A planet which does not include the Earth within its orbit is called an inferior planet; Mercury is therefore an inferior planet. A superior planet does include the Earth within its orbit.

86. It is also evident that Mercury does not shine by his own light; if he did, he would not lose it in his inferior conjunction, or appear with different phases.

87. From Mercury's vicinity to the sun, no spots have been discerned on his disk; we therefore imagine him to revolve on his axis from analogy.

88. Mercury is distinguished by this character ☿.

Of Venus.

89. This planet is the next in order from Mercury: her greatest angular distance from the sun is never so great as 96 times the sun's diameter, she not having a greater elongation than 48 degrees; Venus therefore can never be seen so much as $3\frac{1}{4}$ hours, either before the sun rises or after he sets. When she appears westward of the sun she is called Phosphorus, or the Morning Star; and when eastward Hesperus, or the Evening Star.

89. The inclination of the orbit of Venus to the plane of the ecliptic is $3° 20'$, therefore Venus never appears more than $3° 20'$ on either side of the ecliptic. The ascending node of Venus is now in about $14°$ of Gemini.

90. Venus has an inferior and superior conjunction with the sun. When Venus is in or very near her node, at the time of her inferior conjunction, she appears like a black spot passing over the sun's disk *; and when she is in or very near

* The transit of Venus over the sun's disk will be mentioned hereafter.

near her node, at the time of her ſuperior conjunction, ſhe is entirely eclipſed by the body of the ſun.

91. Venus finiſhes her revolution about the ſun in nearly 224 days, 17 hours: Its appearance is generally large, and ſometimes larger than any other planet; it is alſo the brighteſt of the planets: when viewed through a good teleſcope ſhe appears to have all the phaſes which the moon has.

92. Caſini obſerved two ſpots on Venus, four on Mars, and ſeveral at different times on Jupiter *.

93. Venus is diſcovered, by the motion of her ſpots, to make a complete revolution on her axis in about 24 days, 8 hours; and her axis is found to be inclined to her orbit in an angle of about 75 degrees.

94. From what has been advanced, it is evident that Venus includes both the ſun and Mercury, and that ſhe does not include the earth; for Venus has a ſuperior and an inferior

* Theſe ſpots have likewiſe been obſerved by many other aſtronomers.

 conjunction,

conjunction, and her elongation is greater than that of Mercury, but ſhe is never in oppoſition to the ſun, conſequently therefore ſhe does not include the Earth within her orbit; Venus is therefore an inferior planet.

95. It is alſo evident, that Venus does not ſhine by her own light; if ſhe did, ſhe would not loſe it in her inferior conjunction, or appear with different phaſes.

96. Venus is diſtinguiſhed by this character ♀.

Of MARS*.

97. The Earth is the next planet in order from Venus, and Mars is found to be next in order from the Earth.

98. Mars has no inferior conjunction, but has alternate and ſucceſſively a ſuperior conjunction and oppoſition, in both which ſituations he ſhines with a full face. When Mars is in oppoſition, that is, when the Earth is between him and the ſun, he appears more than ſeven times larger than when he is in his ſuperior conjunction, that is, when the ſun is between him and the Earth;

* The Earth is treated of after the fixed ſtars.

and

and hence we deduce that Mars is ſeven times nearer to the Earth in one ſituation than in the other, and that the Earth cannot be his center of motion; but from calculations reſulting from Mars's apparent different magnitudes, real magnitudes, poſitions, and the diſtance of the ſun, it is found that Mars is ever nearly at the ſame diſtance from the ſun.

99. Mars finiſhes his revolution about the ſun in 686 days, 23 hours. Its appearance is that of a fiery red, and when viewed with a good teleſcope, in certain ſituations, he appears gibbous, or not perfectly round. The inclination of the orbit of Mars to the plane of the ecliptic is 1° 52′, therefore Mars never appears more than 1° 52′ on either ſide of the ecliptic. The aſcending node of Mars is now in about 17° 17′ of Taurus.

100. Mars is diſcovered, by the motion of his ſpots, to revolve on his axis in about 24 hours 40 minutes, and his axis is found to be perpendicular to the ecliptic.

101. From what has been advanced it is evident that Mars includes the ſun, the Earth, and the inferior planets, within his orbit, and that the

the ſun is his center of motion; Mars is therefore a ſuperior planet.

102. It is alſo evident that Mars does not ſhine by his own light; if he did he would not appear gibbous in certain ſituations.

103. Mars is diſtinguiſhed by this character ♂.

Of JUPITER.

104. This planet is found to be the next in order from Mars *.

105. Jupiter has no inferior conjunction, but has alternate and ſucceſſively a ſuperior conjunction and oppoſition, in both which ſituations he ſhines with a full face.

106. Jupiter finiſhes his revolution about the ſun in about 4332 days, 12 hours. He is a bright refulgent ſtar, of a blueiſh caſt, and appears to have a conſiderable magnitude. When viewed with a good teleſcope, there appear ſwarths or belts on his diſk; at different times theſe ap-

* From the laws which all the planets are found to obſerve, or from its parallax, hereafter mentioned.

pear

pear broader or narrower, and in different ſituations. The moons of all the primary planets move round their reſpective primaries as their center of motion, and are, with their primaries, carried round the ſun. Theſe moons, or ſatellites, are therefore called ſecondary planets. Jupiter is alſo found to have four moons revolving about him. The firſt moon, or that neareſt to Jupiter, goes round him in 1 day, 18 hours, 27 minutes, and 34 ſeconds of our time; the ſecond in 3 days, 13 hours, 13 minutes, and 42 ſeconds; the third in 7 days, 3 hours, 42 minutes, and 36 ſeconds; and the fourth, or outermoſt, in 16 days, 16 hours, 32 minutes, and 9 ſeconds. The diſtance of the firſt moon in ſemidiameters of Jupiter is 5,667, of the ſecond 9,017, of the third 14,384, of the fourth 25,299. The three neareſt moons fall into Jupiter's ſhadow, and are eclipſed in every revolution; but the orbit of the fourth moon is ſo much inclined, that it paſſeth by its oppoſition to Jupiter, without falling into his ſhadow, two years in every ſix. By theſe eclipſes aſtronomers have not only diſcovered that the ſun's light takes up about eight minutes of time in reaching the Earth *, but have alſo determined the longitude

* When Jupiter is nearly in conjunction with the ſun, theſe eclipſes happen about 16½ minutes later than when Jupiter

tude * of places on the Earth with greater certainty and facility than by any other method.

107. The inclination of the orbit of Jupiter to the plane of the ecliptic is 1° 20′, therefore Jupiter never appears more than 1° 20′ on either side of the ecliptic. The ascending node of Jupiter is now in about 7° 29′ of Cancer.

108. Jupiter is discovered, by the motion of his spots, to revolve on his axis in about 9 hours and 56 minutes, and to have his axis nearly perpendicular to his orbit.

Jupiter is in opposition, which plainly shews that light must take about 8¼ minutes to pass through the diameter of the earth's orbit.

* The first or nearest moon is the most advantageous for the purpose of determining the longitude of places, because its motion is quicker than the motion of any of the others, thereby having quicker immersions and emersions. In the Nautical Ephemeris the eclipses of Jupiter's moons are calculated for the time at Greenwich; suppose, then, at some other place an eclipse of one of the moons to happen an hour later than the time of its happening at Greenwich, it is evident that such place must be 15 degrees west from Greenwich, &c. If it had been observed two hours sooner than at Greenwich, the place must have been in 30 degrees east of Greenwich. The rolling of a ship prevents all nice telescopical observations at sea, otherwise the longitude of the ship's place might always be sufficiently determined when Jupiter was visible.

109. From

109. From different phænomena of Jupiter it is evident that he revolves about the ſun as a center, and that he revolves in a more diſtant orb than Mars.

110. When any of Jupiter's neareſt moons are diametrically interpoſed between him and the ſun, a round black ſpot may be ſeen on his diſk; and when he is diametrically interpoſed between his moons and the ſun, the moons diſappear. From the eclipſe, therefore, which happens on his body in one ſituation, and from his not illuminating his ſatellites in the other, it is evident that neither he nor his moons ſhine by their own light.

111. Jupiter is diſtinguiſhed by this character ♃.

Of SATURN.

112. This planet is found to be the next in order from Jupiter.

113. Saturn has no inferior conjunction, but has alternate and ſucceſſively a ſuperior conjunction and oppoſition, in both which ſituations he ſhines with a full face.

114. Saturn

114. Saturn finishes his revolution about the sun in about 10,759 days, 7 hours. By reason of this planet's great distance it appears to have but a feeble light. When viewed with a good telescope it is found to be encompassed with a thin broad ring, which appears about the middle, as if united in the same plane with another concentric ring. The edge of the ring is next the body of the planet, and in all parts at a distance equal to the breadth of the flat part *.

115. Saturn is also found to have five moons revolving about him. The first moon, or that nearest to Saturn, goes round him in 1 day, 21 hours, 18 minutes, and 27 seconds; the second in 2 days, 17 hours, 41 minutes, and 22 seconds; the third in 4 days, 12 hours, 25 minutes, and 12 seconds; the fourth in 15 days, 22 hours, 41 minutes, and 14 seconds; and the fifth, or outermost, in 79 days, 7 hours, and 48 minutes. The distance of the first moon in semidiameters

* The ring disappears twice in every annual revolution of Saturn, viz. when he is in 19 degrees of Virgo, and when he is in 19 degrees of Pisces. When Saturn is in the middle between these two points, viz. in the 19th degree of Gemini or of Sagittarius, his ring appears most open to us; the oblique view we at that time have of its flat part causes its longest diameter to appear in proportion to its shortest, about as 9 to 4.

of

of Saturn is $2\frac{1}{10}$, of the ſecond 2,69, of the third 3,75, of the fourth 8,7, and of the fifth 25,35.

116. The inclination of the orbit of Saturn to the plane of the ecliptic is 2° 30′, therefore Saturn is never found more than 2° 30′ on either ſide of the ecliptic. The ring is found to be inclined to the ecliptic in an angle of 30°. The aſcending node of Saturn is now in about 21° 13′ of Cancer.

117. From the great diſtance of Saturn from the ſun no ſpots have been diſcovered on his diſk; we therefore imagine him to revolve on his axis from analogy.

118. From different phænomena of Saturn it is evident that he revolves about the ſun as a center, and that he revolves in a more diſtant orb than Jupiter.

119. Saturn is diſtinguiſhed by this character ♄.

Of

Of the GEORGIAN PLANET, *commonly called* GEORGIUM SIDUS.

120. This planet, which is the moſt diſtant of any we know, was diſcovered by William Herſchel, Eſq. of Bath, in the year 1781. From its motion already known, the time of its revolution is computed to be about 83 years. With a good teleſcope, which magnifies about 300 times, it appears to have a very well defined diſk, but with inſtruments of a ſmaller power it can hardly be diſtinguiſhed from a fixed ſtar of between the ſixth and ſeventh magnitude. Its light is of a blueiſh white colour, and in brilliancy between that of the moon and of Venus. In a very fine clear night, when the moon is abſent, it may be ſeen by the naked eye *.

* From what has been advanced concerning the appearances of the different planets, they may eaſily be known from each other; for if after ſun-ſet a planet be obſerved nearer the eaſt than the weſt, it cannot be either Mercury or Venus, and the light and colour of it will determine whether it be Mars, Jupiter, or Saturn.

Of Comets.

121. They move round the ſun, and croſs the orbits of the planets in all manner of directions. They are not confined within the zodiac, but admit any inclination to the ecliptic whatever. The eccentricity of their orbits is ſo very great, that ſome of them perform the greateſt part of their motion almoſt in right lines. In one part of their journey through the heavens, they approach ſo near the ſun as to be exceedingly heated; and after having paſſed the ſun, they ſeem to haſten back to the fixed ſtars, entering ſo far into the regions of infinite ſpace, as to be almoſt totally deprived of light and heat. Moſt comets have a denſe and dark atmoſphere ſurrounding their bodies, which weakens and blunts the ſun's rays, but within it appears the nucleus, or ſolid body of the comet, which, when the clouds are diſperſed, gives a ſplendid and briſk light. Few of them can be ſeen till their near acceſs to the ſun; but in their receſs they appear with long beards, like tranſparent hair, or with tails of fire, which, with regard to the comet, are always pointed directly, or nearly ſo, toward that part of the heavens, which is oppoſite to the ſun. Thoſe that are viſible before they

U are

are in conjunction with the ſun, begin, at a near approach, to put forth their beards, or tails, which at firſt are ſhort and thin, but grow longer and thicker; and if very near the ſun in the conjunction, they ſend forth fiery beams of light every way: after this they put forth a tail 40 or 50 degrees long, which becomes gradually leſs, and diminiſhes in ſplendor as the comet recedes further. At any diſtance in their receſs, their beards, or tails, are larger and longer, than at an equal diſtance in their acceſs. Many of the comets, without their train, appear no bigger than ſtars of the firſt magnitude.

122. The comets are found to obſerve the ſame laws which the planets obey, in regard to deſcribing equal areas in equal times, &c. (hereafter noticed.)

123. It is believed that there are at leaſt 21 comets belonging to our ſyſtem; but of all the comets, only the periods of three are known to any degree of certainty. One of theſe three appeared in 1531, 1607, 1682, and 1758, its period being about 75 years. Another appeared in 1532 and 1661, and is expected to return in 1789, its period being about 129 years. The remaining one appeared in 1680; its periodical revolution is computed to be 575 years.

Of

Of the FIXED STARS.

124. Several ſtars which appear ſingle to the naked eye, are diſcovered by the teleſcope to be double, and others treble.

125. Many changes have been obſerved to take place among the fixed ſtars, in regard to magnitude, luſtre, appearance, and diſappearance, beſides ſome other very trifling changes of places; for inſtance, the bright ſtars Syrius and Arcturus have been obſerved to change their places, by moving towards the ſouth between two and three minutes of a degree in a century. As none of the ſtars which ſuddenly appeared, and after a time diſappeared, were ever obſerved to have motion, parallax, or tails, it is evident they could not be comets.

126. The fixed ſtars are obſerved to change their longitude weſtward 50 ſeconds every year, thereby making a degree in 72 years, and taking 25,920 years to make an entire revolution; and hence it is that the conſtellations ſeem to have deſerted the places anciently allotted them; for the beginning of the ſign Aries, which in Hipparchus's time was near to, and gave name to the

the vernal equinoctial point of the ecliptic, is now removed near a whole ſign, or 30 degrees eaſtward, ſo that Aries is where Taurus was, Taurus where Gemini was, &c. and thus it is that the conſtellations on the zodiac of the celeſtial globe do not agree in figure and character. For to avoid confuſion, aſtronomers have thought fit to let the ſeveral portions of the ecliptic where thoſe conſtellations were firſt obſerved to be, retain their old names, ſo that the vernal equinoctial point is ſtill reckoned to be the firſt point of Aries: however, theſe portions of the ecliptic where the conſtellations were at firſt obſerved, are called *Anaſtra*, to diſtinguiſh them from the places where they now are, which are termed *Stellata*.

127. Sir Iſaac Newton inveſtigated the cauſe of this motion of the heavens, which is termed the *Preceſſion of the Equinoxes*, and demonſtrated it to reſult from the ſpheroidal figure of the earth, whereby the poles of the world revolve round thoſe of the ecliptic. From this preceſſion of the equinoctial points in *antecedentia*, (i. e. contrary to the order of the ſigns), or from eaſt to weſt, the equinoctial points meet the ſun every year 50 ſeconds of longitude before a complete revolution has been performed. The time in which

which the sun * is revolving from tropic to tropic, is called the *Tropical Year*, which, with the time he has yet further to go to complete the revolution, viz. 50 seconds, is called the *Syderial Year*.

As for the nature of the fixed stars, their immense distance leaves us at a loss about it, what we can gather for certain from their phænomena is as follows:

128. That the fixed stars are greater than our Earth; because if that were not the case they could not be visible at such an immense distance.

129. The fixed stars are further distant from the Earth than the furthest of the planets; for, we frequently find the fixed stars hid behind them, and besides, they have no parallax †, which the planets have.

130. The fixed stars shine with their own native light, for they are much further from the sun than Saturn, and appear much smaller than

* I have before observed, that it is customary to speak of apparent motions as real, when the conclusion is not affected by it.

† Hereafter defined.

Saturn; but since notwithstanding this they are found to shine much brighter than Saturn, it is evident they cannot borrow their light from the same source which Saturn does, viz. the sun; but since we know of no other luminous body beside the sun, whence they might derive their light, it follows that they shine with their own native light.

131. Besides, it is known, that the more a telescope magnifies, the less the aperture is through which the star is seen, and consequently the fewer rays it admits to the eye. Now, since the stars appear less through a telescope which magnifies 200 times than they do to the naked eye, insomuch that they seem to be only indivisible points, it proves at once that the stars are at an immense distance from us, and that they shine by their own proper light. If they shone by borrowed light, they would be as invisible without telescopes as the satellites of Jupiter are; for these satellites appear bigger, when viewed with a good telescope, than the largest fixed stars. Hence,

132. We deduce that the fixed stars are so many suns, for they have all the characters of suns.

133. That

133. That in all probability the ſtars are not ſmaller than our ſun.

134. That it is highly probable each ſtar is the center of a ſyſtem, and has planets or earths revolving round it in the ſame manner as round our ſun, i. e. it has opake bodies illuminated, warmed, and cheriſhed by its light. As we have incomparably more light from the moon than from all the ſtars together, it is abſurd to imagine that the ſtars were made for no other purpoſe than to caſt a faint light upon the Earth, eſpecially ſince many more require the aſſiſtance of a good teleſcope to find them out, than are viſible without that inſtrument. Our ſun is ſurrounded by a ſyſtem of planets and comets, all which would be inviſible from the neareſt fixed ſtar; and from what we already know of the immenſe diſtance of the ſtars, it is eaſy to prove that the ſun ſeen from ſuch a diſtance would appear no bigger than a ſtar of the firſt magnitude.

From all this it is highly probable that each ſtar is a ſun to a ſyſtem of worlds, moving round it, though unſeen by us *.

* From paragraph 129 to this reference, is the copy of a tranſcript I formerly made from ſome author, but from whom I cannot now recollect.

Of the EARTH.

135. It has been obſerved that Mercury and Venus are inferior planets, and that Mars, Jupiter, Saturn, and the Georgium Sidus are ſuperior planets, alſo that Mars is the next planet in order from the earth; that the earth therefore revolves about the ſun as a center, is evident from her place, and likewiſe from the phænomena of the ſuperior planets viewed from it; for the ſuperior planets viewed from it appear ſometimes *ſtationary*, i. e. ſtanding ſtill, and ſometimes to have a *retrograde*, i. e. a backward motion; which appearances of ſtation and retrogradation in bodies which move in circular orbits, and circumſcribe a fixed point, cannot happen from the fixed point; for the motion of a moving body in a circumſcribing circle will always ſhew its motion, whether the fixed point be in, or near its centre, or otherwiſe, and will always appear to move in the ſame order: but ſuppoſe ſeveral bodies with different velocities to revolve round one common center, then the ſwifter motion of the body in a circumſcribed circle will ſometimes cauſe an apparent ſtationary or retrogradatory appearance in the moving body, which revolves in a circumſcribed circle.

136. The inferior planets have sometimes like appearances of station and retrogradation with the superior planets; but this phænomenon would happen if the Earth were at rest; for while an inferior planet passes from near its greatest elongation, either towards the Earth, or from it, its appearance will be stationary, for the line of sight then passing from the eye to the planet is a tangent to the planet's orbit, (in all other situations the eye passes within, or cuts the orbit), and according as the planet's motion is quicker or slower, it will to sight remain a longer or shorter time before it is apparently out of this tangent or touch line. When an inferior planet is passing between its greatest elongation west to its greatest elongation east, its motion will appear to be *in consequentia*, or direct, that is, from west to east, agreeable to the order of the signs; but while it is passing between its greatest elongation east and its greatest elongation west, its motion will appear retrograde, or from east to west; for in the first mentioned passage, it moves in that half of its orbit which is next the Earth, and in the second mentioned passage, it moves in that half of its orbit which is furthest from the Earth. Let any thing be moved in a circle before the eye, and it will have one motion from left to right, and the other from right to left.

137. But

137. But the times in which either the stations and retrogradations, or conjunctions and oppositions of the planets happen, are not such as they would be if the Earth were at rest, but precisely such as would happen were the Earth to move round the sun in the space of a year. The Earth's period or revolution, moreover, is greater than that of Venus, and less than that of Mars, as would naturally follow from such a motion.

138. It has been observed that all the planets revolve from west by south to east, in orbits nearly circular; the several phænomena arising from their motions prove them not to be strictly so, and that the only curve they can move in, to reconcile all the various appearances, is an ellipsis *, and also that the sun is not placed in the center, but in one of the foci of the ellipsis.

139. The *Center of an Ellipsis*, is that point within it where two lines bounded by opposite points in the curve, one the longest, and the other the shortest that can possibly be drawn within it, cross each other; the longest of which lines is called the *Transverse Diameter*, and the shortest, the *Conjugate Diameter*.

* See Plate 3, fig. 1.

140. By

140. The *Foci of an Ellipsis*, are two points in the transverse diameter on each side of the center.

141. If two lines be drawn from the foci of an ellipsis, so as to meet each other in the periphery, (or bounding curve), their sum will be always equal to the transverse diameter.

142. The distance between the center of an ellipsis and either of its foci, is called the *Eccentricity*.

143. If a line be drawn parallel to the conjugate diameter of an ellipsis through either of its foci, it must divide the ellipsis into two unequal parts. From this circumstance it is, that our summer is nearly eight days longer than our winter; for the sun takes about 186 days 12 hours in its apparent passage from the first degree of Aries to the first degree of Libra*, and only about 178 days 18 hours in its apparent passage through the winter signs. The sun's apparent diameter is also greater in our winter, at which time the Earth is in Perihe-

* Let it be remembered, that the Earth is always in the opposite sign to that in which the sun appears.

lion,

lion, than in our summer, when it is in Aphelion *.

144. The orbits of the planets and comets are ellipses of different curvatures, having one common focus, in which the sun is fixed.

145. From what has been advanced it is evident that the planets are sometimes nearer to, and sometimes further from the sun. When a planet is in that point of its orbit which is nearest to the sun, it is said to be in *Perihelion*, and when in that point of its orbit which is furthest from the sun, to be in *Aphelion*. The Aphelion is called the *Superior Apsis*, and the Perihelion, the *Inferior Apsis*, and a straight line that would join the inferior and superior Apses, is called the *Line of the Apsides*.

146. The mean distance of a planet from the sun, is, when the planet is at either extremity of the conjugate diameter. The planet's mo-

* Hence it is evident that heat does not entirely depend on the vicinity of the sun, but in a great measure on its vicinity to the zenith, whereby its rays pass through a less portion of the atmosphere, or on its long continuance above the horizon. The secondary causes of different soils, the situation of waters, and winds also, influence the degrees of heat and cold in equal latitudes.

tion

tion is likewiſe mean at that time, i. e. it would with ſuch motion deſcribe the whole orbit in the ſame time it is deſcribed in.

147. All the planets move faſter as they approach the ſun, or come nearer to the Perihelion, and ſlower as they recede from the ſun, or come nearer to the Aphelion; and hence it is, that the ſun's apparent motion is no ways equal, but that he now and then ſlackens his pace, and afterwards quickens it again. The time, therefore, which the ſun's apparent motion ſhews, is different from the true and equable time ſhewn by a well regulated clock, whereby all the celeſtial motions are to be eſtimated and accounted. The time ſhewn by ſuch a clock, and a true ſun dial is never the ſame, but on the 15th of April, the 16th of June, the 31ſt of Auguſt, and the 24th of December. Had the Earth no other motion but that round its axis, all the days would be preciſely of the ſame length, but while the Earth is turning round its axis, it is likewiſe proceeding forward in its orbit, and likewiſe moves quicker or ſlower as it is nearer to, or farther from the ſun; the ſame will be found if, ſetting aſide the conſideration of the Earth, we conſider the apparent motion of the Sun in lieu thereof, as being what we meaſure time by.

On

On this principle we obſerve, that the day not only includes the time of one revolution of the globe on its axis, but it is increaſed by ſo much as anſwers to that part of the ſun's motion performed in that time; for, when that part of the equinoctial which, with the ſun was at the meridian yeſterday at noon, is come thither again to-day, it is not yet noon, the ſun not being now at the place where he yeſterday was, but gone forward near a degree, more or leſs; and this additament above the 24 equinoctial hours is upon a double account unequal. In that, though the ſun ſhould always move equally in the ecliptic, yet equal arches of the ecliptic do not in all parts of the zodiac anſwer to equal arches of the equator, becauſe ſome parts thereof, as the two ſolſtitial points, lie nearer to a parallel poſition to the equinoctial than others, for inſtance, than thoſe about the equinoctial points.

As the natural and apparent days from their inequality, cannot properly be applied in meaſuring the celeſtial motions, Aſtronomers have been obliged to invent other days for the uſe of their calculations, that are of a mean length between the longeſt and ſhorteſt of apparent days. Theſe are had by conſidering the number of hours in the whole revolution of the Earth in the

ecliptic,

ecliptic, and dividing the whole time into as many equal parts as there are hours, 24 of which conſtitute the day; and the reduction of the days conſtitutes the equation of natural days: conſequently, computing theſe motions according to equal time, it is neceſſary to turn that time back again into apparent time, that they may corrreſpond to obſervation: on the contrary, any phænomenon being obſerved, the apparent time thereof muſt be converted into equal time to have it correſpond with the times marked in the Aſtronomical Tables.

148. The Earth revolves from any fixed ſtar to the ſame again in 365 days, 6 hours, 9 minutes, and 14 ½ ſeconds, which is 20 minutes, 17 ½ ſeconds longer than the true ſolar or tropical year; for,

149. The ſolar year, or the time which the Earth takes to revolve from either tropick or ſolſtice to the ſame again, contains 365 days, 5 hours, 48 minutes, and 57 ſeconds, which is the proper or natural year, becauſe it always keeps the ſame ſeaſons to the ſame months, provided the exceſs above 365 days be properly accounted for.

150. The civil ſolar year contains 365 days for three years running, which are called com-

mon

mon years; and then comes in what is called the Bissextile, or Leap Year, which contains 366 days; this is also called the Julian Year, on account of Julius Cæsar, who appointed the intercalary day every fourth year, thinking thereby to make the civil and solar year keep pace together; and this day being added to the 23d of February, which, in the Roman Calendar, was the sixth of the Calends of March, that sixth day was twice reckoned, by counting the 23d and 24th as only one day, and this was called *Bis sextus dies*, and thence comes the name Bissextile for that year. In our almanacks this day is added to the end of February.

151. The year thus settled was in use in England till 1752; but it being somewhat more than eleven minutes longer than the solar tropical year, the times of the equinoxes went backward, and fell earlier by one day in about 130 years. In the time of the Nicene Council, A.D. 325, the vernal equinox fell on the 21st of March, and about the year 1582, Pope Gregory XIII. who was convinced of the inequality between the Julian and the Solar Year, and that the Moveable Feasts had got too forward by ten days from the seasons, for which they were fixed at the Council of Nice, ordered ten days to be

be ſtruck out of that year, and the next day after the fourth of October was accordingly called the fourteenth. When the alteration was made in Great-Britain, eleven days were ſtruck out of the Calendar, to make it agree with the Gregorian account. This reckoning is now called the *New Style*, and the Julian the *Old Style*.

152. When the Gregorian Calendar was agreed to, that there might not again be occaſion for a like alteration of ſtyle, it was ſettled, that inſtead of making every hundredth year a biſſextile (which happens according to the common courſe) every four hundredth year only of the centuries, reckoning from 1600, ſhould be ſo accounted *. The length of the ſolar year, and the time of the vernal equinox, were by this means accurately ſettled; for as a day was gained in about 130 years by the former method of reckoning, this proved ſo nearly equivalent, that many thouſands of years will elapſe before there is occaſion for any further correction of ſtyle.

153. A *Cycle of the Sun* is a revolution of 28 years, in which time the days of the months re-

* This was provided for in England, where the ſtyle was not altered till 1752, by taking a day more out of the Calendar than was done at Rome, &c. where the firſt alteration of ſtyle took place.

turn again to the ſame days of the week, and the ſun's place to the ſame ſigns and degrees of the ecliptic which they were on 28 years before, ſo as not to differ one degree in a hundred years.

154. A *Cycle of the Moon*, called alſo the *Golden Number*, is a revolution of 19 years; in which time the conjunctions, oppoſitions, and other aſpects of the moon, are within an hour and a half of being the ſame as they were on the ſame days of the month 19 years before.

155. It has already been obſerved, that when the ſun appears in the equinoctial, the days and nights are equal in all parts of the world, the axis of the Earth muſt therefore be then perpendicular to the plane of the equinoctial, and oblique to the plane of the ecliptic in the ſame angle, viz. about $23\frac{1}{2}$ degrees, that the plane of the ecliptic makes with the plane of the equinoctial; and as the north pole of the Earth's axis inclines more or leſs toward the ſun from the vernal to the autumnal equinox, and more or leſs from the ſun from the autumnal to the vernal equinox, in both caſes agreeable to the ſun's declination, it is evident that the Earth's axis preſerves the ſame parallel ſituation in every part of its orbit, and that its inclination to its orbit, that is, to the ecliptic,

ecliptic, occasions the different seasons, and the different lengths of days and nights *.

156. Jupiter and Mars, whose axes are perpendicular to the plane of their orbits, must thereby have equal days and nights, and equal seasons, for the sun's rays must constantly fall perpendicularly on their equators: but Venus must have very different lengths of days and seasons, since her axis is inclined to the plane of her orbit in so large an angle as 75 degrees, whereby the sun's greatest declination from her equator will be 75 degrees, and consequently its altitude the same when it is at its nearest distance to the zenith of either pole.

* If a circle of wire be placed horizontally round the flame of a candle, and crossed by another wire circle, in such a position as to make an angle of $23\frac{1}{2}$ degrees with it, and a terrestrial globe of about three inches diameter be suspended from either pole by a string, and with a steady hand moved round the circle, which makes the same angle with the horizontal one that the ecliptic makes with the equinoctial, the parallels of latitude and frigid zones, when the globe is in different situations of the circle, will be illumined in the same proportion as they are on the Earth itself. If the thread be first twisted, the globe will at the same time revolve as on an axis, and thereby in its progress represent the diurnal as well as the annual motion of the Earth, and the different seasons.

157. The motions of the Earth and all the other planets are certain, and follow an immutable law, whereby "*they all describe equal areas from the sun's center in equal times*;" that is, if a straight line were to pass from the center of the sun to the center of any planet, and to be carried with the planet round the sun, such a line, commonly called the *Radius Vector*, would constantly pass over an equal space in an equal time: for though when a planet moves slowest, it describes a less portion of the elliptic curve; yet the planet at that time, from being more distant from the sun, must lengthen the Radius Vector, and thereby cause it to sweep a greater space than when the planet was less distant from the sun, and passed over a like portion of the curve. This law of the planets motions was first discovered by Kepler, who demonstrated it from observation. Sir Isaac Newton accounted for this law from a centripetal force, which urges the planets toward the sun.

158. The nearer any planet is to the sun, the quicker and shorter its period of revolution will be. The great law which all the planets immutably fulfil, is, that "*The squares of the times of their revolutions are to each other as the cubes of their mean distances from the sun*;" therefore if the

the distance of any one of them be known, the distance of any other may be found. Suppose, for instance, that the Earth's distance from the sun were known, and it was required to find the distance of Mercury; then, As the square of the time in which the Earth performs its revolution about the sun, is to the square of the time in which Mercury performs his revolution about the sun, so is the cube of the Earth's mean distance from the sun, to the cube of the mean distance of Mercury from the sun; and extracting the cube root of this last number (viz. the answer to the rule of three stating) will give the distance sought. By this rule it is demonstrable, that if the Earth's mean distance be supposed to be divided into 100,000 equal parts, Mercury's mean distance from the sun will be equal to 38,710 of those parts; Venus's mean distance to 72,333; Mars's to 152,369; Jupiter's to 520,096; Saturn's to 954,006; and that of Georgium Sidus to 1,894,736. The knowledge of this second law of the planets, from which the above calculations are made, we also owe to Kepler, who by observation discovered it, and found it to obtain in all the primary planets, which astronomers have since found it to do, between all the secondary planets and their respective primaries. Sir Isaac Newton accounted

for this law from the centripetal force which urges the planets toward the ſun being in an inverſe ratio of the ſquare of the diſtance.

159. From what has been advanced of the relative diſtances of the planets from the ſun, it is evident that when the real diſtance of any one of them is known in miles, we may eaſily find the diſtances of all the reſt; for as the relative diſtance of any planet is to its real diſtance, ſo is the relative diſtance of any other planet to its real diſtance.

160. The real diſtances of the planets are determined by means of a parallax.

161. Parallax is the apparent difference of place that any celeſtial object has, or would appear to have, if viewed from different ſituations.

162. The nearer any object is, the greater its parallax will be. Let us firſt conſider parallax as it would find the diſtance of earthly * objects. Suppoſe, then, a perſon at ſome diſtance from a wall of conſiderable extent, varied with different diſcernible colours, and that any object at a ſmall diſtance, a tree for inſtance, be between

* I intreat the liberty of extending the uſual acceptation of the word Parallax to the preſent purpoſe.

the

the ſpectator and the wall, the ſight would transfer the tree to a certain part of the wall, that is, the tree would eclipſe a certain part of the wall. Again; ſuppoſe the ſpectator to move to ſome diſtance in any direction but in that of the preſent line of ſight, [I mean the line which paſſed from the eye to the tree, or the part of the wall eclipſed by it, in the firſt ſituation] he will then find the tree eclipſes a different part of the wall; now the diſtance between the preſent part of the wall which is eclipſed, and the former part, is the parallax which the tree appeared under from the two places of obſervation. If the ſpectator goes at greater diſtances from the tree, and meaſures equal diſtances between other two ſtations, in like directions with the former, he will find the parallaxes become leſs and leſs, till they appear almoſt or totally inſenſible. Now, if the angles of the bearing of the two parts of the wall which were eclipſed by the tree, or, which is the ſame in the preſent caſe, the angle which the tree made with the line uniting any two ſtations, be taken with a proper inſtrument, and the diſtance between the two ſtations be meaſured, then the diſtance of the tree from either of theſe ſtations may be found by plane trigonometry; for it is a maxim in trigonometry, that when any three things in a

plane triangle are known, except the three angles only, the rest may be found. The tree in the present case is the vertex of the triangle, the distance between the two stations is the base, and the line of sight from each station, the angles of which, with the base, were measured, are the other sides of the triangle, each of which is opposite to its respective angle at the base.

163. From what has been advanced concerning the nature of parallax, and determining the distance of objects, it appears that some determined measure, as a base whereon to form the angles, is required; this being the case, it is therefore requisite in determining the distance of celestial objects, to know the exact measure of the distance between the two places of observation on the Earth's surface. Now not only a trifling space on the Earth's surface is known, but also its whole circumference, and its diameter; for the length of a degree or a 360th part of its circumference, may be found either on a meridian, or on the equator, if the extreme points which include the degree be first accurately determined by celestial observation; but as a situation cannot be found wherein deviations from a level and obstructions would not occur in measuring a degree according to the usual manner of

measuring the extent of a mile, it has been found necessary towards obtaining the measure of a degree with accuracy, to have recourse to favourable situations, the quadrant, telescope, micrometer, and continued objects making straight or parallel lines with each other the whole extent of the degree. Suppose the objects for observation to be in one continued straight line from each other, then the exact distance between any two objects may be found by trigonometry, such distance would form the base of a triangle, and the sum of all the bases would be equal to the extent of the degree.

164. When one degree is obtained the whole circumference is no longer unknown; and when the circumference is known, the diameter may be soon found, for the proportion between the cirumference of every circle, and its diameter is the same *.

* Archimedes fixed the proportion between the circumference and diameter of a circle at 22 to 7; but as 355 to 113 is nearer the truth, and as 3.14159 to 1 still nearer, this last is within less than a three millionth part of an unit of the truth. The exact proportion has never been found, though the approximation to truth has been brought nearer to the real proportion than the proportion between a diameter, which is only one thousandth part of an inch shorter than the diameter of the Earth bears to the diameter of the Earth.

165. A

165. A degree on the Earth's ſurface is about 69$\frac{1}{2}$ Engliſh miles, the circumference 25,000, and the diameter 7,970.

166. The ſemi-diameter of the Earth being known, it ſerves as a meaſure between two ſtations, one in the rational horizon, and the other in the zenith, wherefrom to find the difference of place which a celeſtial object would appear to have in the celeſtial ſphere from two ſuch ſituations, which difference would be the horizontal parallax of the object, and would occupy ſuch ſpace in the heavens, as the Earth's ſemi-diameter would appear to occupy, if viewed from the ſame diſtance as the celeſtial object.

167. If the center of an artificial globe were exactly in the Earth's center, with its equator in the plane of the Earth's equator, and two lines were infinitely continued from its center, one paſſing through its equator, and the other through one of its poles, ſuch lines would paſs one through the Earth's equator to the equinoctial, and the other through one of the terreſtrial poles to the correſponding celeſtial pole, and a line generated from the center of the artificial globe, and infinitely extended through one of its parallels, would paſs through the like parallel

rallel on the Earth's ſurface, and mark out the correſponding declination in the Heavens. Suppoſe again, a line to paſs from the pole of the artificial globe to the Earth's ſurface, parallel to that which paſſed through its equator, the diſtance between theſe parallel lines is the diſtance between the ſenſible and the rational horizon of the artificial globe, and is the meaſure of its ſemi-diameter; ſuch line then, ſuppoſing the artificial globe to be nine feet in diameter, would paſs nine feet from the true equatorial diviſion, which is leſs than the eleventh part of a ſecond of a degree from it; and ſuch would be the angle, viz. about the eleventh part of a ſecond of a degree, that the ſemi-diameter of ſuch an artificial globe would appear under, were it poſſible to be ſeen at the diſtance of 3985 miles, the meaſure of the Earth's ſemi-diameter.

168. A body as large as the Earth would ſubtend no more than a minute of a degree in the heavens, at a diſtance where the circumference of a circumſcribing circle would be 21,600 times greater than the diameter of the Earth.

169. The fixed ſtars have no ſenſible parallax, the ſun and primary planets have ſmall ones, and the moon has a very conſiderable one.

170. If

170. If a celestial object have a sensible parallax, it may from a latitude equal to the object's declination be thus determined, viz. by finding the exact distance in time from the object's being in the sensible horizon * to its arrival at the zenith, and subtracting this time from a fourth part of the time which the object takes to pass from meridian to meridian again, viz. the time it takes to pass from the rational horizon to the zenith: the difference between these times call the remaining time; convert the remaining time into an arch of longitude by the following proportion, &c. As the time which the object takes to pass from the rational horizon to the zenith, is to the time in which it was found to pass from the sensible horizon to the zenith, so is 90 degrees to the content of the arch between the sensible horizon and the zenith, which arch subtracted from 90 degrees, will give the arch contained between the rational and sensible horizons, and is the arch which agrees with the remaining time, which is the horizontal parallax of the celestial

* When a celestial object is so distant that the Earth's semi-diameter would appear from it as a dimensionless point, the rational and sensible horizon of such a celestial object would appear the same, and shew no sensible parallax.

object,

object, and the angle under which the Earth's ſemi-diameter would appear at an equal diſtance.

171. Now, to find the diſtance of the celeſtial object by its parallax juſt found, there is the Earth's ſemi-diameter given, the angle under which it appears, viz. the parallax, and the angle which the horizon makes with the Earth's ſemi-diameter, which is a right angle, which are ſufficient data for determining the reſt *.

I have thus far exerted myſelf, to inform the young aſtronomer on what grounds a part of aſtronomy and its calculations are founded, and ſhall proceed with cautious circumſpection to elucidate what more appears to me as requiſite for a ſcholar, and perſon of general knowledge to be acquainted with.

172. In finding the parallax of the ſun, or, which is the ſame, the angle under which the Earth's ſemi-diameter would appear at that diſt-

* As in the preſent caſe, the diſtance of the object from the Earth is required, I would conſider the rational horizon as radius, the parallax will then be the tangent angle, and the Earth's ſemi-diameter the tangent. Then, as the tangent angle is to the tangent, ſo is radius to the diſtance of the object from the Earth's center.

ance,

ance, the angle is so exceedingly small, that a mistake of one second would occasion an error of about seven millions of miles.

Judge then of the exactness required in finding the parallax of any celestial object. The declinations and diameters of the sun and moon also are continually increasing or decreasing *, and the refraction of the atmosphere † makes bodies appear higher than they really are; all these things, therefore, must be taken properly into the account.

Many different methods for finding the parallax of a celestial object are laid down by astronomical writers ‡; but as this is not a treatise for practical professors in this part of Astronomy, the foregoing will be sufficient.

173. *Annual Parallax*, is the change of the apparent place of a celestial object, which is

* The increase and decrease of declination, and of the diameters of the sun and moon, may be found in the Nautical Ephemeris.

† The horizontal refraction is the greatest, which at a mean is about 34 minutes of a degree; the power of refraction is affected by the different states of the air. Near the equator the refractions are accounted the most regular. See Introduction, sect. 14.

‡ Several may be found in Chambers's Cyclopædia.

caused

caused by being viewed from the Earth in different parts of its orbit.

174. The annual parallax of all the planets is very considerable, but that of the fixed stars is imperceptible.

175. In old books of astronomy, the mean distance of the Earth from the sun is generally set down at 82 millions of miles, and in modern books at more than 195 millions. This difference in the account, arises from an inexactitude in discovering the true parallax of so distant a body as the sun by the usual method. The true parallax of the sun was found by the transit of Venus in 1761, and confirmed by a second transit in 1769.

176. We are indebted for this excellent method to Dr. Edmund Halley; the following are extracts from the Dissertation upon the subject which he presented to the Royal Society.

" About forty years ago, when I was in the Island of St. Helena, taking a catalogue of the stars near the South Pole, I had an opportunity of observing the passage of Mercury over the sun's disk, which succeeded better than I could have

have expected; for, by means of a telescope twenty-four feet long, I determined the very moment when Mercury, entering upon the sun, seemed to touch his inward limb; and also, when in going off, it struck the limb of the sun's disk, forming the angle of interior contact, by which means I found the interval of time during which Mercury appeared upon the sun, even without an error of a single second of time."

"For the lucid line, intercepted between the dark limb of the planet, and the bright limb of the sun, although exceedingly fine, may be easily seen by the naked eye; and the little dent made in the sun's limb, by Mercury's entering or leaving the disk, appears in the first case to vanish, and in the latter, to begin almost instantaneously. When I perceived this, it came immediately into my mind, that the sun's parallax might be accurately determined by such kind of observations as these, provided Mercury were nearer the Earth, and had a greater parallax from the sun. But the differences of these parallaxes is always less than the solar parallax, which we seek; and therefore Mercury, though he may frequently be seen in the sun, is not to be looked upon as fit for our purpose."

"There

"There remains, then, the tranſit of Venus over the ſun's diſk, whoſe parallax, being almoſt four times as great as the ſolar parallax, will cauſe very ſenſible differences between the times in which Venus will ſeem to be paſſing over the ſun from different parts of the Earth. And from theſe differences, if they be properly obſerved, the ſun's parallax may be determined, even to a ſmall part of a ſecond. Nor are any other inſtruments required for this purpoſe than common teleſcopes, and clocks, which are good of their kind; and in the obſervers, nothing more is requiſite than fidelity, diligence, and a moderate ſkill in aſtronomy.

"For there is no need that the latitude of the place ſhould be ſcrupulouſly obſerved, nor that the hours themſelves ſhould be accurately determined with reſpect to the meridian: it is ſufficient that the clocks be regulated according to the motion of the heavens, provided the times be accurately reckoned from the total ingreſs of Venus into the ſun's diſk, to the beginning of her egreſs from it; that is, when the dark globe of Venus firſt begins to touch the bright limb of the ſun within; which moments I know, by my own experience, may be obſerved to within a ſecond of time.

"But on account of the very ſtrict laws by which the motions of the planets are regulated, Venus is ſeldom to be ſeen within the ſun's diſk; and during the courſe of 120 years it could never be once obſerved; namely, from the year 1639 (when this moſt pleaſing ſight happened to that excellent youth Horrox, our countryman, and to him only ſince the creation) to the year 1761; in which year, according to the theories that have been hitherto found agreeable to the celeſtial motions, Venus will again paſs over the ſun, on the 26th of May, in the morning; ſo that at London, about ſix o'clock in the morning, we may expect to ſee her near the middle of the ſun's diſk, and not above four minutes of a degree ſouth of his center.

"The whole duration of this tranſit will be almoſt eight hours; namely, from two o'clock in the morning to a little before ten; and therefore the ingreſs will not be viſible in England; but as the ſun will, at that time, be in the 16th degree of Gemini, having near 23 degrees of north declination, it will be ſeen without ſetting in almoſt every part of the north frigid zone; and therefore the inhabitants of the coaſt of Norway, beyond the city of Drontheim, as far as the North Cape, will be able to obſerve Venus en-

tering the ſun's diſk; and perhaps the ingreſs of Venus upon the ſun, when riſing, will be ſeen by the Scotch in the northern parts of the kingdom, and by the inhabitants of the Shetland Iſles, formerly called Thule.

But at the time when Venus will be neareſt the ſun's center, the ſun will be vertical to the northern ſhores of the bay of Bengal, or rather over the kingdom of Pegu, near the mouth of the Ganges; and therefore as the ſun, when Venus enters his diſk, will, in the adjacent countries, be almoſt four hours towards the eaſt, and as many towards the weſt, when ſhe leaves it, the apparent motion of Venus over the ſolar diſk will be accelerated by almoſt double the horizontal parallax of Venus from the ſun; becauſe Venus, at that time, is carried with a retrograde motion from eaſt to weſt, whilſt a ſpectator placed upon the Earth's ſurface, is turned the contrary way, from weſt to eaſt.

"Suppoſing therefore the ſun's parallax to be twelve ſeconds and a half, as I have before conjectured, the parallax of Venus will be forty-three ſeconds; from which, if the former be ſubtracted, there will remain thirty ſeconds and a half, for the horizontal parallax of Venus from

the sun; and therefore at those places which lie near the tropic, the motion of Venus will be increased by that parallax forty-five seconds at least, whilst she passes over the sun's disk; and still more so at all places which are situated near the neighbourhood of the equator.

"Now Venus at that time will move over the sun's disk very nearly at the rate of four minutes of a degree in an hour, and therefore eleven minutes of time, at least, are to be allowed for the forty-five seconds of a degree above mentioned; which, therefore, is the space of time the duration of the eclipse, caused by Venus, will, on account of the parallax, be shortened. And from this diminution of the time only, we might safely enough draw a conclusion concerning the parallax which we are in search of, provided the apparent diameter of the sun and the latitude of Venus were accurately known; but in a matter of such subtlety we cannot expect an exact computation.

"We must therefore endeavour to obtain, if possible, another observation, to be taken in those places where Venus will be in the middle of the sun's disk at midnight; that is, in places under the opposite meridian to the former; or

about

about six hours, or ninety degrees west of London; and where Venus enters upon the sun's disk a little before sun-set, and goes off a little after its rising. And this will happen under the above-mentioned meridian, and where the elevation of the north pole is about fifty-six degrees; that is, in a part of Hudson's Bay, near a place called Port Nelson. For in this and in the adjacent countries the parallax of Venus will increase the duration of the transit, by at least six minutes of time; because, whilst the sun, from his setting to his rising, seems to pass under the pole, those places on the Earth's surface will be carried from east to west, or with a motion conspiring with that of Venus; and therefore Venus will seem to move more slowly on the sun, and to be longer in passing over his disk.

" If therefore it happen that this transit should be properly observed by skilful persons, at both these places, it is clear, that the duration of it will be seventeen minutes longer as seen from Port Nelson, than as seen from the East Indies. Nor is it of much consequence whether the observation be made at Fort St. George, commonly called Madras, or at Bencoolen, on the western shore of the island of Sumatra, near the equator."

The Doctor then proceeds to point out other places belonging to different powers where the transit might be advantageously observed, and wishes that many observations of the same phænomenon may be taken by different persons at several places, both that a greater degree of certainty might be derived by their agreement, and also lest any single observer, by the intervention of clouds, should be deprived of a sight, on which depended the certain and adequate solution of a problem the most noble in the sciences. In the strongest and most earnest terms the Doctor then recommends his admonitions to be diligently applied by those curious astronomers, who may have an opportunity of making the necessary observations, in which he wishes them all imaginable success, and draws towards a conclusion of the subject by adding,

"And thus have I shewn, that, by this method, the sun's distance may be determined to within its five hundredth part, which will doubtless appear very extraordinary to some. But if an accurate observation be made at each of the places above mentioned, I have already demonstrated that the durations of the eclipse made by Venus, will differ from each other by seventeen minutes of time; that is, upon a supposition that the

the ſun's parallax is twelve ſeconds and a half, but if the difference ſhould be found by obſervation to be greater or leſs, the ſun's parallax will be greater or leſs in nearly the ſame proportion: and ſince ſeventeen minutes of time are anſwerable to twelve ſeconds and a half of ſolar parallax, for every ſecond of parallax there will ariſe a difference of more than eighty ſeconds of time; ſo that if we have this difference true to two ſeconds, it will be certain that the ſun's parallax is to within a fortieth part of a ſecond, and, therefore, this diſtance will be determined to within its five hundredth part, at leaſt, if the parallax be not found leſs than we have ſuppoſed, for forty times twelve and a half is five hundred."

177. The reſult of theſe obſervations, ſo ſtrongly recommended by the Doctor, determined the ſun's parallax at a mean to be only about eight ſeconds and a half; this was further confirmed to be the caſe by obſervations made on a ſecond tranſit of Venus over the ſun's diſk in 1769 *. The trigonometrical calculations from this parallax, viz. eight ſeconds and a half, find

* There will not be another tranſit of Venus till the year 1874.

the Earth's diſtance from the ſun in round numbers to be ninety-five millions of miles.

178. At the time of the tranſit in 1761, the Earth's diſtance from the ſun to its mean diſtance, was as 1015* to 1000, and Venus's diſtance was 726, (her mean diſtance being about as 723, when the Earth's mean diſtance is conſidered as 1000); ſubtract, therefore, 726 parts from 1015, and there will remain 289 of ſuch parts for Venus's diſtance from the Earth at the time of the tranſit; hence it appears that Venus's parallax at that time muſt be almoſt four times as great as the ſolar parallax at the ſame time. Venus's parallax, therefore, which is diſcovered by the tranſit, muſt be very ſenſible, as ſeen from different parts of the Earth's ſurface. The apparent breadth of the part of the ſun's diſk, over which Venus paſſed at the time of the tranſit, was eaſily determined, and alſo the time of Venus's moving over ſuch a ſpace.

* Venus's parallax, therefore, as well as the ſun's muſt have been leſs at this diſtance than they would have been at the mean diſtance, or at any nearer diſtance; and a difference in parallax muſt affect the times of the durations of a tranſit, as ſeen from the Earth's center, and from its ſurface.

179. Let us now examine how the transit of Venus would have appeared, could it have been seen from the Earth's center *; the Earth's motion on its axis, would not in such a situation have made the time in which Venus passed over the sun's disk, differ from the true calculated time in the Astronomical Tables, and as seen from that part of the Earth's surface where Venus was vertical at the first moment of total ingress; the same appearance would present itself as at the Earth's center; for a straight line passing from the Earth's center to Venus, would also pass through such part on the Earth's surface: if then at the first moment of time when the body of Venus appeared completely within the sun's disk at the Earth's center, or the mentioned part on its surface, Venus was observed east of this place, where the sun was not much above the horizon, she appeared to have made a considerable progress on the sun's disk, for the first moment of complete ingress would there

* The place of any phænomenon, as it would appear from the Earth's center, which always is the same as it appears when seen from that part of the Earth's surface where the phænomenon is vertical, is called the true place of its phænomenon; hence some astronomers have defined the parallax of any phænomenon to be the distance between the true and apparent place in the heavens.

have

have appeared some time; but west of the same part, where the sun was not much above the horizon, the ingress would not then have appeared, and must have been some time after before it could be completed. The apparent places of Venus, as seen from different parts of any meridian, where the transit was visible, appeared nearer to, or further from the sun's equator; such differences of apparent place are termed the *Parallax of Latitude*: on some parts of the same meridian, the whole of the transit could be seen, on other parts only a part could be seen, and on the remaining parts it was totally invisible. All those places where the transit began at twelve at noon, and ended after that time, Venus had an eastern parallax from the sun at the beginning, and a western parallax from the sun at the end, which must have contracted the duration of the transit, by causing it to begin later, and end sooner, at such places, than it would have done as seen from the Earth's center. By finding, therefore, how much the duration of the transit was more or less, as seen from proper places, than its true duration, as seen from the Earth's center, given by true astronomical tables, the parallax of Venus is ascertained, and then the parallax of the sun may be found by the following easy proportion; for the horizontal

parallaxes

parallaxes of the planets are inversely as their distances from the Earth's center, viz. As the Earth's relative distance from the sun at the time of the transit, Is to Venus's relative distance from the sun at the same time, So is the parallax of Venus to the parallax of the sun.

The true distance of the Earth from the sun being obtained by means of the sun's parallax, the true distances of all the planets may be easily obtained, as has already been shewn in treating of the relative distances of the planets; and the true distances of the planets being obtained, and their apparent diameters at these distances being known, the real diameters and bulks may be easily found.

180. The Earth's diameter, as seen from the sun, subtends an angle of double the sun's horizontal parallax, viz. 17 seconds, and the sun's diameter, at a mean, is about 32 minutes; the sun's diameter to the Earth's, therefore, is as 1920 to 17 *.

181. The

* The apparent diameters of the planets, measured with a micrometer, that of the sun and of moon, according to De la Hire's Observations, and those of Mercury, Venus, Mars, Jupiter, and Saturn, according to Hevelius's Observations,

181. The relative bulks of spherical bodies are proved by geometry to be to each other as the cubes of their diameters; the sun's bulk, therefore, to the Earth's, is as 7,077,888,000 to 5832, or something more than a million of times larger *.

In like manner may the diameters and bulks of the rest of the planets be as easily determined.

The quantities of matter in the several planets are determined by the laws of gravity.

servations, are, when they appear least, mean, and greatest, as follows:

	Least. ′ ″ ‴	Mean. ′ ″ ‴	Greatest. ′ ″ ‴
Sun -	31 38 —	32 1 —	32 43 —
Moon -	29 30 —	31 30 —	33 30 —
Mercury	— 4 4	— 6 3	— 11 48
Venus -	— 9 30	— 16 46	1 5 58
Mars -	— 2 26	— 5 2	— 20 50
Jupiter	— 14 36	— 18 2	— 24 22
Saturn	— 14 10	— 16 2	— 19 40

The apparent diameter of the Georgium Sidus is now about four seconds; whence we infer, that its real diameter is to that of the Earth as 4.454 to 1; it is, therefore, of considerable bulk, and except Jupiter and Saturn, by far the largest of the remaining planets.

* The sun is more than 500 times as big as all the planets together.

182. Light

182. Light is found by optical experiments to decreaſe in proportion as the ſquares of the diſtance increaſes.

183. The light and heat, therefore, ſo far as it depends on the ſun's rays, which are diſtributed to the planets, are inverſely as the ſquares of their diſtances from the ſun *.

184. The motion of light, combined with the motion of the Earth in its orbit, produces a very trifling alteration of the places of the fixed ſtars, according to their ſituations; ſuch alterations of place are termed the *Aberration* of their light. This aberration completes all its various phænomena regularly every year †.

* Hence it is, that the more a teleſcope magnifies the diſks of the planets, the dimmer they appear to the eye, becauſe the teleſcope cannot magnify the quantity of light as it does the diſk, and therefore the ſame quantity of light is ſpread over a larger ſurface.

† Dr. Bradley was the firſt who completely ſolved theſe phænomena; he had repeatedly, and almoſt continually made the moſt minute and exact obſervations on the fixed ſtars from the year 1725 till two or three years after, before he, from convincing proofs, could determine the cauſes of the alternate and regular changes of the places of the fixed ſtars.

A TABLE OF THE AFFECTIONS OF THE PLANETS.

	Mercury.	Venus.	Earth.	Mars.	Jupiter.	Saturn.	Georgium Sidus.
Periodical Revolutions on their Axes	* * *	days. hours. 24 8	day. 1	hours. min. 24 40	hours. min. 9 56	* * *	* * *
Periodical Revolution about the Sun	days. hours. 87 23	days. hours. 224 17	days. hours. 365 6	days. hours. 686 23	days. hours. 4332 12	days. hours. 10759 7	days. 30445
Proportionable mean Distances	387	723	1000	1523	5200	9540	19000
Mean Distances from the Sun in English Miles	36841468	68891486	95173127	145014148	494990976	907956130	1800000000
Diameters in English Miles; that of the Sun is 890000	3100	9360	7970	5150	94100	77990	35498
Proportion of Light, that of the Sun being as 1	6.68	1.91	1.00	.43	.037	.011	.00276
Proportion of Bulk, that of the Sun being as 1280000	$\frac{1}{15}$	$\frac{8}{9}$	1	$\frac{7}{24}$	1400	1000	90
Eccentricities, or Distance of the Center from the Focus	7960	510	1680	14218	25277	53163	82034
Inclinations of their Orbits to the Ecliptic	° ′ 6 54	° ′ 3 20	* * *	° ′ 1 52	° ′ 1 20	° ′ 2 30	′ ″ 43 35

Of

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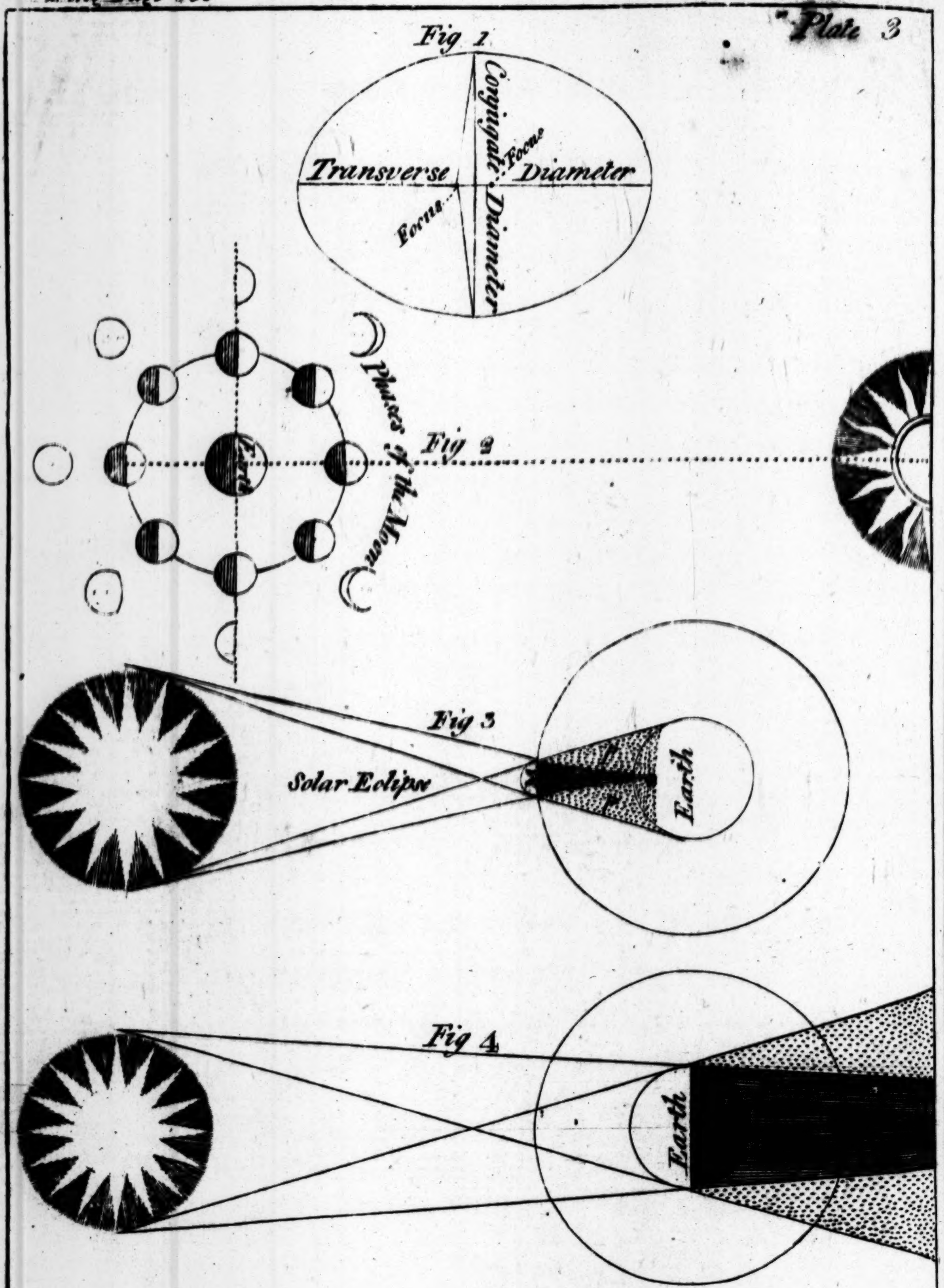

Of the MOON.

185. It is not a primary planet, but only a satellite, or attendant of the Earth, round which it revolves, and with which it is carried round the sun. Its mean distance from the Earth is found to be about 240,000 miles; its eccentricity 13,000, and the inclination of its orbit to the plane of the ecliptic about 5° 18′; its diameter about 2180 miles; its bulk equal to about a fiftieth part of the Earth's, and it revolves round its axis in the same time in which it revolves round the Earth. Its axis also is almost perpendicular to the ecliptic.

186. While the Moon is performing her course round the Earth in its own orbit, the Earth and it are making their progress round the sun, and both are advancing toward the east; the time, therefore, which the Moon takes to revolve from one point of the heavens to the same again, called the *Siderial*, or *Periodical Revolution*, will be different from the time it takes to revolve from the sun to the same apparent situation with regard to the sun again, called the *Synodical Revolution* *.

187. The

* The motions of the hour and minute hands of a watch may serve to give some idea of the periodical and synodical revolutions

187. The Moon completes her periodical revolution in about 27 days, 7 hours, and 43 minutes, and her synodical revolution in about 29 days, 12 hours, and 44 minutes.

188. The line of the Moon's nodes makes a complete revolution in antecedentia, in about nineteen years.

189. The node from which the Moon has north latitude, is called the Ascending Node, or the Dragon's Head, marked ☊; and the node from which the Moon has south latitude, is called the Descending Node, or the Dragon's Tail, marked ☋.

190. When the Moon is in conjunction, or opposition to the sun, she is said to be in her *Sygizies*, and when at 90 degrees distance from the sun, to be in her *Quadratures*.

191. When the Moon, or any planet is at its nearest distance from the Earth, it is said

revolutions of the moon, for when the minute hand has performed a complete revolution, it has yet some distance to go to have the same meeting with the hour hand which it had an hour before.

to

to be in *Perigee,* and when at its fartheſt diſtance, in *Apogee.*

192. When the Moon is in Perigee, it moves quickeſt, and when in Apogee, ſloweſt; its motion continuing to increaſe or decreaſe as it is moving towards the one point or the other.

193. The line which unites the points of Perigee and Apogee, is called the line of the Apſides.

194. In the Moon's quadratures the ſun's action adds to the gravity of the Moon, and the force it adds is greater as the diſtance of the Moon from the Earth is greater, ſo that the action of the ſun hinders her gravity towards the Earth from decreaſing, as much while the diſtance increaſes, as it ought to do according to the regular courſe of gravity; and, therefore, while the Moon is in her quadratures, her apſides muſt recede. In the Syzigies the action of the ſun ſubducts from the gravity of the Moon towards the Earth, and ſubducts the more as her diſtance from the Earth is greater, ſo as to make her gravity decreaſe more as her diſtance increaſes, than according to the regular courſe of gravity; and therefore in this caſe the apſides

are in a progressive motion, because the action of the sun subducts more in the syzigies from her gravity than it adds in her quadratures, and, in general diminishes more than it augments her gravity; and hence the progressive motion of the apsides exceeds the retrograde motion, and the apsides are carried round in consequentia.

195. All bodies moving in orbits, have a tendency to fly off from their orbits, and to move in right lines *; therefore, to keep them in their orbits, some power must constantly draw or impel them towards the center. This last impulse is called the *Centripetal* force; the other, by which they endeavour to fly off in right lines, is called the *Centrifugal* force. These forces are so wisely combined and adjusted, that the accelerated motion in the lower apsis, and the diminished motion in the higher apsis respectively correct the increase or decrease of the gravitory powers.

196. The center of gravity between any two revolving bodies, is the point in which they are in equilibrio; its distance from their centers is inversely as their quantities of matter.

* This may be instanced by a pebble whirled round one's hand in a sling.

197. When one body moves round another, both of them muſt move round their common center of gravity.

The common center of gravity between the Earth and the Moon is 6000 miles from the Earth's center.

The *Anomaly* of the Moon, or of any planet, is the diſtance of any ſuch body in ſigns, and degrees from that point of its orbit which is at the greateſt diſtance from that body round which it revolves. The *true Anomaly* is the real place of the body, and the *mean Anomaly*, the place which it would at any time be in, were it to move uniformly in its orbit. The Sun's Anomaly means the diſtance it has apparently gone from its apogee with reſpect to the Earth *.

The apparent place of the Moon, or of any planet in the heavens, as ſeen from the Earth, is called the *Geocentric Place*; and the place which the Moon, or any planet would appear to have in the heavens, if ſeen from the Sun, is called the *Heliocentric Place*.

198. If the area of an ellipſis be ſo divided, that the whole elliptic area may have the ſame pro-

* Not the diſtance it has to go, however trifling.

portion to any arch, as the periodical time in which the planet deſcribes its orbit has to the time given; the place of the planet in its orbit for ſuch given time after it has left the aphelion, may be thereby found *.

199. From the inequalities in the Moon's motion, it has ever been conſidered as a problem of the utmoſt difficulty to calculate her true place in the heavens. Newton was the firſt who pointed out the ſource of her irregularities, and the mode of inveſtigating them; and from the principles he laid down, we have gradually obtained a more exact theory of the Moon than could have been expected by former aſtronomers, inſomuch that tables are now calculated, which are ſeldom found to differ in any part more than a minute from the truth.

200. A luminous body can enlighten only one half of an opaque globe at once, and, therefore, at any given moment, the ſun can enlighten only one half of the Moon.

* Kepler's problem for determining a planet's place for any given time is ſtated thus: "To find the poſition of a right line, which paſſing through one of the foci of an ellipſis, ſhall cut off an area deſcribed by its motion, which ſhall be in any given proportion to the whole area of the ellipſis."

When

When the Moon is in conjunction with the sun, she disappears, because her unenlightened side is then toward the Earth; when she is in opposition to the sun she appears full, because her whole illuminated side is then toward the Earth; when she is in her quadratures, or a quarter of a circle distant from the sun, she appears half full, because only one half of her enlightened side is then toward the Earth. Before and after the quadratures she has all the possible variety of phases between a thin circular line and a full face, according to her situation with respect to the sun. The points of the circular line, which appear just before and after the conjunction, or new Moon, are called the *Moon's Horns*. See plate 3.

201. All the planets and satellites are enlightened by the sun, and cast shadows toward that part of the heavens which is opposite to the sun, as seen from them.

202. As the sun is bigger than any planet or satellite, the shadows of the planets and satellites must be conical, ending in points at certain distances, according to the several magnitudes and distances of the bodies from which they are cast.

203. The Moon is eclipſed when ſhe falls into the Earth's ſhadow; but this can only happen when ſhe is oppoſite to the ſun with reſpect to the Earth, that is, at the time of Full Moon.

204. The ſun is eclipſed when the Moon is ſo directly between the Earth and the ſun, as to prevent the rays of the ſun from falling on a part of the Earth's ſurface; but this can only happen at the time of New Moon.

205. If the Moon revolved about the Earth in the plane of the ecliptic, it would always be eclipſed when full, and the ſun would always appear eclipſed in thoſe parts of the Earth where the Moon happened to be vertical at the time of its conjunction, i. e. at every New Moon; but one half of the Moon's orbit being towards the north pole of the ecliptic, and the other half towards the ſouth pole of the ecliptic, and making an angle of more than $5\frac{1}{3}$ degrees with the plane of the ecliptic, the Earth's ſhadow is too pointed at the diſtance of the Moon to fall on the Moon's ſurface at the time of full, except when ſhe is in or within 12 degrees * of one of

* This admits of ſome variation, for when the Moon is in perigee, ſhe will be eclipſed if within $12^{\circ}\frac{1}{30}$ of one of

of her nodes; and when the Moon is more than 18 degrees from either of her nodes at the time of conjunction, ſhe paſſeth either northward or ſouthward of the part of the ecliptic the ſun is in.

206. When the Earth's ſhadow covers the whole body of the Moon, the Moon is ſaid to be *totally* eclipſed; when the Moon paſſes through the center of the Earth's ſhadow, ſhe is ſaid to be not only totally but *centrally* eclipſed; and when the whole body is not covered by the Earth's ſhadow, ſhe is ſaid to be *partially* eclipſed. When the whole body of the ſun is hid from any ſpace of the Earth where the Moon is vertical at the time of her conjunction, he is ſaid to be totally eclipſed *. When the diameter of the ſun appears larger than the diameter of the Moon, ſo that a line uniting the center of the Earth and Moon, would, if continued, likewiſe paſs through the center of the ſun, the eclipſe is ſaid to be *annular*, for a bright ring will appear to ſurround the Moon in thoſe parts to which the Moon is then vertical. When

of her nodes. The ſolar limit alſo is $18^{\circ}\frac{1}{3}$ in perigeal eclipſes.

* From the motion of the Moon in her orbit, a total eclipſe of the ſun can never exceed four minutes.

the whole body of the ſun is not hid from any part of the Earth's ſurface, he is ſaid to be partially eclipſed.

207. In ſolar eclipſes, beſide the entirely darkened parts on the Earth's ſurface, there are adjacent parts, which are only partially deprived of the ſun's light; this partial deprivation of the ſun's light, is called the *Penumbra*. See Fig. 3. plate 3, where p. p. repreſents the *Penumbra*.

When the Penumbra firſt touches the Earth, the general eclipſe begins, and when it leaves the Earth, the general eclipſe ends.

208. The Moon's dark ſhadow covers only a ſpot on the Earth's ſurface, about 180 Engliſh miles broad, when the Moon's diameter appears largeſt, and the ſun's ſmalleſt; but the partial ſhadow, or Penumbra, may cover a circular ſpace of 4900 miles diameter. The longeſt duration of a total and central eclipſe of the Moon, from beginning to end, is, 3 hours, 57 minutes, and 6 ſeconds; and the ſhorteſt duration of the ſame, from beginning to end, 3 hours, 37 minutes, and 26 ſeconds. The longeſt duration happens when the Moon is in apogee, at which time ſhe moves ſloweſt, and the ſhorteſt duration,

duration, when she is in perigee, at which time she moves quickest.

209. A twelfth part of the sun or Moon's diameter, is called a *Digit*; and in eclipses, it is generally said how many digits are eclipsed at certain times, according to the number of parts which are involved in darkness.

210. An eclipse of the Moon always begins on the Moon's eastern side, and goes off on her western side; but an eclipse of the sun begins on the sun's western side, and goes off on his eastern side.

211. It is difficult to observe exactly either the beginning or ending of a lunar eclipse, even with a good telescope, because the Earth's shadow is so faint and ill defined about the edges, that when the Moon is either just touching or leaving it, the obscuration of her limb is scarcely sensible, and cannot be ascertained to within less than four or five seconds of time; but both the beginning and ending of solar eclipses are very discernible, for the moment that the edge of the Moon's disk appears to touch the sun's disk, his roundness seems a little broken in that part, and

and the moment the Moon goes off from the sun's disk, he appears perfectly round again.

212. If the Moon's nodes had no motion through the signs of the ecliptic, in whatever signs the Sun and Moon were eclipsed in any given year, they would be so in every year after; but the eclipses fall so much back every year, from the consequent toward the antecedent signs, as to prove that the nodes move backward about $19\frac{1}{3}$ degrees every year, and, therefore, the same node will come round to the sun about 19 days sooner every year than upon the preceding one, and in about 18 years, 225 days, the nodes will go backward through the whole ecliptic.

213. At whatever time of the year we have an eclipse about either of the nodes, in 173 days after there will be an eclipse about the opposite node; if the node had no motion, the interval between these conjunctions would be $182\frac{1}{2}$ days, or half a year.

214. In about 18 years and 11 days after a conjunction of the Sun and Moon with either node, there will happen a like conjunction with the same node, and, therefore, in that time there

is

is a period, or return of the ſame eclipſes. In this term of time there happen very nearly 223 lunations, for after the Sun, Moon, and nodes have been once in a line of conjunction, they return ſo nearly to the ſame ſtate again, that the ſame node which was in conjunction with the Sun and Moon at the beginning, will have been within 28 $\frac{1}{5}$ minutes of a degree * of a line of conjunction with the Sun and Moon again, when the laſt of theſe lunations was completed. In this period, (which is generally allowed to have been firſt diſcovered by the Chaldeans), there are 18 Julian years, 11 days, 43 minutes, and 20 ſeconds, when there have happened four Leap Years within that ſpace of time; and 18 Julian years, 10 days, 43 minutes, and 20 ſeconds, when five Leap Years have happened within the ſame time: therefore, if to the mean time of any eclipſe, either of the Sun or Moon, there be added one of theſe times, according as four or five days extraordinary have happened within ſuch ſpace, it will give the mean time of the return of the ſame eclipſe.

* The falling back of the line of conjunctions, or oppoſitions of the Sun and Moon, viz. 28 $\frac{1}{5}$ minutes with reſpect to the line of the nodes in every 223 lunations, will, after many ages, be exhauſted, after which it will not return again in leſs than 12,492 years.

215. The

215. The greateſt number of eclipſes of both luminaries, which can happen in a year, is ſeven, and the leaſt two, but the moſt uſual number is four; and it is very ſeldom that more than ſix happen, one half of which are generally inviſible at any particular place.

216. Eclipſes of the Sun are more frequent than thoſe of the Moon, becauſe his ecliptic limits are greater, the Moon's limits being only about 12 degrees from the node, and the Sun's 17; but there are more viſible eclipſes of the Moon than of the Sun, becauſe a lunar eclipſe may be ſeen from a whole hemiſphere of the Earth's ſurface at once, whereas a ſolar eclipſe is confined to a ſmall portion of the Earth's ſurface.

217. From what has been advanced concerning eclipſes, it is evident that towards calculating the time in which eclipſes will happen, it is neceſſary to know the number of mean conjunctions and oppoſitions which will happen in the ſpace of the year, and likewiſe how often at the times in which they happen the two luminaries will be within the limits of the node which occaſion an eclipſe. In order to facilitate ſuch operations, there are aſtronomical ta-

bles,

bles, computed from the theory of gravitation, by which the Sun and Moon's places, with every other neceſſary particular may be had.

218. When the Moon is viewed through a good teleſcope, there appear vaſt cavities and aſperities upon various parts of her diſk; ſome parts exactly reſemble deep caverns, and others mountains and valleys. Several aſtronomers have given accurate maps of the face of the Moon, with the name, as well as figure of every ſpot *.

219. In every ſituation of the Moon, the elevated parts are found to caſt a triangular ſhadow in an oppoſite direction to the Sun; on the contrary, the cavities are always dark on that ſide next the Sun, and illuminated on the oppoſite ſide, which proves exactly conformable to what we obſerve of hills and cavities on the Earth's ſurface. The line, moreover, which bounds the light and dark parts when the Moon is not full, is not an even, regular curve as it would be upon a ſmooth, ſpherical ſurface; but an ir-

* Their names are generally thoſe which aſtronomers have borne, who diſtinguiſhed themſelves in aſtronomy.

regular broken line, full of dents and notches *; beyond this broken line, on the darkened part, ſome ſmall, and many large bright ſpots appear ſtanding out at ſeveral diſtances, which ſpots, when the Moon is increaſing, in a few hours become larger, and at laſt unite with the enlightened portion of the diſk.

220. By finding with a micrometer in a teleſcope, what proportion the diſtance of the top of a mountain in the Moon from the circle of illumination, bears to the diameter of the Moon, the height of a mountain on the ſurface is determined. The depths of the lunar cavities are found to exceed the heights of the mountains conſiderably.

221. A ſpot, or place on the Moon, of about 70 Engliſh miles diameter, is juſt viſible to the naked eye: hence a teleſcope which magnifies 200 times will juſt diſcover a ſpot, whoſe diameter is $\frac{1}{200}$ part of 70 miles, which is leſs than half a mile.

* The outer edge of the diſk does not appear jagged and irregular, becauſe the ſurface is mountainous all over; for we do not view a ſingle row of mountains and cavities as in the above caſe, but a large zone having many mountains, one behind another, thereby filling up cavities which would otherwiſe appear.

222. From

222. From the Moon's revolving on its axis in the ſame time that it revolves about the Earth, ſhe always preſents the ſame face towards us; but ſince this motion about her axis is equable and uniform, and her motion about the Earth, or common center of gravity, is unequal and irregular, as being performed in an ellipſis, it muſt follow that preciſely the ſame part of the Moon's face cannot be conſtantly turned toward the Earth; and this is confirmed by the teleſcope, through which we often obſerve a little gore, or ſegment on the eaſtern or weſtern limb, appear and diſappear by turns, as if her body librated to and fro, from which this phænomenon is called the *Moon's Libration.*

223. The Moon has no viſible atmoſphere, for ſhe is never obſcured by clouds or vapours; and the fixed ſtars, at the time of occultation, from the interpoſition of her body, diſappear inſtantaneouſly, without any gradual diminution of their light.

224. The attractions of the Sun and Moon are found to be the cauſes of the flux and reflux of the ſea. Kepler was the firſt who appeared to have had an idea of the true cauſes: in his *Introduction to the Phyſics of the Heavens,* he thus explains

explains himſelf: "The orb of the attracting power, which is in the Moon, is extended as far as the Earth, and draws the waters under the torrid zone, acting upon places where it is vertical, inſenſibly on confined ſeas and bays, but ſenſibly on the ocean, whoſe beds are large, and the waters have the liberty of reciprocation, that is, of riſing and falling." And in the 70th page of his *Lunar Aſtronomy*, "But the cauſe of the tides of the ſea appears to be the bodies of the Sun and Moon drawing the waters of the ſea." Sir Iſaac Newton improved theſe hints, and ſoon ſhewed the manner in which the tides were affected.

225. The nature of the tides is ſuch, that they ebb and flow alternately, without intermiſſion, and follow a general rule. In open ſeas the tides riſe to very ſmall heights to what they do in channels or wide-mouthed rivers, opening in the direction of the ſtream or tide; for in channels growing gradually narrower, the water is accumulated by the confines of the banks. The tides are ſo retarded in their paſſage through channels and ſhoals, and otherwiſe ſo variouſly affected by ſtriking againſt cliffs and headlands, that at different places in, and nearly in the ſame longitude, the ebb and flood happens at

very

very different times, and the times of flooding and offing are unequal. The times, however, of flood and ebb at any particular place, happen at the same interval of time from the full or change of the Moon, and continue to flow and ebb alternately in certain intervals of time, the flood and ebb happening about 50 minutes later on any day than it did on the preceding day, agreeable to the times on which the Moon comes later to the meridian on the particular day than it did on the preceding one.

226. The tides in the Baltic and Mediterranean Seas, by reason of the very narrow inlets by which they communicate with the ocean, are, in general, insensible.

227. Sir Isaac Newton calculated the attractive powers of the Sun and Moon on the tides, and found the Moon's attraction to be about three times greater than the Sun's.

When the Sun and Moon act jointly on the tides, which is at the change and full of the Moon, the tides are stronger and run higher than at other times, and are called *Spring Tides*; but when the Sun and Moon are ninety degrees

apart, their attractive powers are opposed, and occasion the tides to be weaker and lower than at other times, and are called *Neap Tides**.

228. When it is high water on any meridian, it is likewise high water on the opposite meridian. The cause of this affection was also proved from the laws of gravity by Sir Isaac Newton; the following are the principles on which it is accounted for;

* The Spring Tides happen about three days after the change and full of the Moon, by which time the accumulated attracting powers of the Sun and Moon, not then overcome by their change of place with regard to each other, is greatest; and the Neap Tides happen about three days after the Moon has passed her quadratures, by which time the diminished powers of attraction from the opposed actions of the Sun and Moon, not then overcome by their change of place with regard to each other, is least. The Spring and Neap Tides are greater or less, in proportion as the Sun and Moon are nearer to or further from the Earth at the times in which their attracting powers are united or opposed; and the tides, in general, are in some measure influenced by the different declinations of the Sun and Moon. The times of high water on east and west shores, where the waters have not been obstructed in their direct passage, do not happen when the Moon is on the meridian, or the opposite meridian of such east and west shores, but about three hours after she has passed such meridians, by which time the accumulated power which raises the tide is not then overcome by the Moon's distance from such meridians.

229. All parts of the Earth having a tendency to fly off, in proportion to their distance from their center of gravity, therefore the waters which at any instant are in the opposite hemisphere to the Moon, have a greater centrifugal force than the Earth's center has; and the Earth's center has a greater centrifugal force than the waters which are turned towards the Moon.

At the Earth's center the Moon's attraction balances the centrifugal force, and consequently her attraction on the side next her is greater than the centrifugal force on that side, and less than the centrifugal force on the opposite side; and as the Moon's attraction on the side next her is greater than the centrifugal force there, her attraction causeth the tide to rise on that side.

As the centrifugal force on the side of the Earth, farthest from the Moon, is as much greater than her attraction, as her attraction on the side next to her is greater than the centrifugal force, the tide must rise as high on that side of the Earth, which is at any instant furthest from the Moon, by the excess of the centrifugal force there, as it rises on the side which is then nearest the Moon by the excess of her attraction.

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